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United States Naval Institute Proceedings

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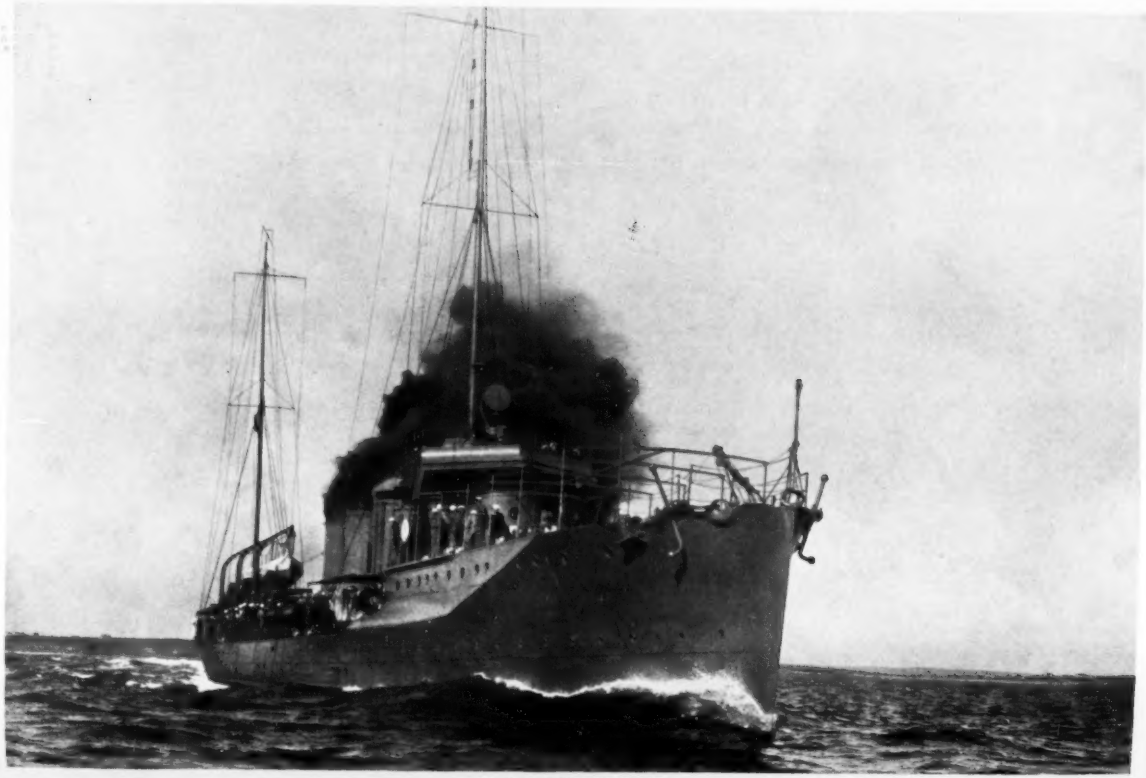

U. S. S. WADSWORTH

UNITED STATES
NAVAL INSTITUTE
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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

THE ENLISTED PERSONNEL OF THE NAVY[1]

By LIEUT. COMMANDER J. K. TAUSSIG, U. S. Navy

Motto: Semper paratus: semper fidelis

INTRODUCTORY

The service at large—officers and men—are familiar with the enlisted personnel in its relation to a single ship organization. The number allowed for the complement; the number allowed in each rating; the rules and regulations governing advancement in rating; the rules and regulations governing discharges; the methods of training and instruction which make a ship efficient; and the relation each individual man and each group of men bears to the ship organization as a whole, are well known to all. But the why and wherefore of the many rules and regulations; the reasons for making changes in them; the organization of the enlisted men's division of the Bureau of Navigation, and the methods of conducting the general administrative business of this division; and the relation of the personnel to the navy as a whole in contradistinction to its relation to an individual ship, are matters concerning which officers and men know very little.

This paper, therefore, does not discuss the personnel in connection with the ship organization, but in its relations to the navy as a whole. The numerical strength, distribution, recruiting and

[1] This paper was written in 1914.

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recruits, administration, training, and suggestions for improving the general condition, are some of the subjects that will be touched upon. It is realized that all phases of the numerous matters that concern so large a body of men cannot be discussed fully in so limited a paper, but the writer hopes to deal with them in a general way, and to give to the readers some information which, although available in other forms, is not looked for simply on account of the trouble involved.

NUMERICAL STRENGTH

The authorized numerical strength of the enlisted personnel was 10,000 just prior to the Spanish-American War. During the war there was an increase of over 140 per cent, the maximum reached being 24,123. This number was reduced to 20,000 in 1900, from which date there has been a gradual but irregular increase, until the present allowed quota of 48,000 men and 3500 apprentices was authorized in 1912. This number is exclusive of prisoners sentenced to dishonorable discharge, and of men serving on vessels loaned to the naval militia of various states. The number of prisoners during the past few years has averaged about 1300. At this writing (December, 1914) there are less than 900, the reduction being due to the new policy adopted in regard to their discharge. There are approximately 400 men serving on board naval militia vessels. It will therefore be seen that when recruited up to the full quota allowed (which is the case at present), there are approximately 52,800 enlisted men in the navy.

A new feature of the last appropriation bill was the insertion of a clause which places the allowed quota not at a maximum, but at an average, so that if during any day or days we are short of the allowed quota, we may bring the average up by being over this quota during the latter part of the fiscal year.

In order not to exceed the authorized strength, the Bureau of Navigation keeps a daily record of all enlistments, discharges, deaths, retirements, desertions, and apprehensions or surrenders of deserters. These records are summarized, and the results carried forward from day to day. Absolute accuracy cannot be claimed for these figures, as the mails must be relied on for the necessary reports; but they are accurate enough for the purpose. In order to check up these figures, the bureau required every pay

officer in the navy to report on July 1, 1914, the exact number of enlisted men's accounts he had on his rolls on that date. The summary of these reports gave a total which was only nine men less than the total carried in the Bureau as made up from the daily reports.

What the numerical strength of the enlisted personnel should be depends upon the policy of the Navy Department as to the number of ships that are kept in commission, and on the number of men expected to be obtained from outside sources in case of hostilities. At present there are approximately 11,000 men who are not serving on board ship in the capacity of part of the authorized crews. This 11,000 is made up of apprentice seamen at the training stations and the men necessary to properly conduct the stations; men under training in the various trade schools and the men required for the proper conduct of the schools; men under treatment in the hospitals and the necessary hospital attendants; men required for service at the various navy yards, naval stations, radio stations, and recruiting stations; men on duty in connection with ships building and men being assembled for vessels about to be placed in commission; men on reenlistment leave and those traveling to and from their respective stations; men awaiting discharge, action of courts, witnesses, etc., and prisoners.

A steady, gradual increase in the numerical strength is more conducive to efficiency than is a large increase every four or five years. In other words, it would be better to have an increase of from 1000 to 2000 men every year than to have an increase of from 5000 to 10,000 every fifth year. By having the gradual increase the recruiting will always be normal and we could maintain the high standard required of the recruits. By having a large increase our efforts are to get the men as soon as possible, with the result that the standard depreciates. By a gradual increase our recruiting stations operate in an economical manner; by having a large increase we must increase the number of stations and the amount of advertising abnormally. This is expensive and leads to extravagance. By having a gradual increase the training stations operate under efficient conditions with approximately the same number of men under training all the time; by a large increase the training stations become overcrowded, with the result that either the proper attention cannot be given the individual members under training, or the course of training must be cur-

tailed. By having a gradual increase the proper balance between the petty officers and the non-rated men can be maintained; by not having an increase for several years, the petty officers' grades become overcrowded, and we have a "hump" similar to that which sometimes occurs in the commissioned officers' grades. There is such a hump at present. There is no way to remedy it except by increasing the numerical strength of the enlisted personnel, thereby enabling the department to place more ships in commission. This, in turn, would open the now closed avenues of promotion for the necessary petty officers required for those vessels.

In case of hostilities with a first class power we would require men as follows:

For serviceable ships now on navy list	72,000
For ships building (soon to be completed)	5,000
For auxiliaries now manned by merchant crews, and additional auxiliaries that must be purchased	7,000
For purposes other than on board ship	11,000
For reserve (to allow for casualties)	5,000
Total	100,000

This is approximately 47,000 more men than allowed for the peace quota.

These 47,000 men would be required immediately. There is no doubt that we could enlist them within six months, but the larger portion of them would be raw recruits. It would take at least two years to recruit and train them for efficient service on board ship. Until this were accomplished we would not be prepared to properly employ for war purposes the material at hand.

DISTRIBUTION

The distribution of the enlisted personnel depends on the ships actually in commission and the requirements of the training stations, navy yards and stations, and other shore details.

The annual report of the chief of Bureau of Navigation for the fiscal year 1914 gives a general summary of the distribution of the enlisted personnel on October 15, 1914.

As it may be of interest to learn the actual distribution by classes of vessels, the following table is inserted.

TABLE SHOWING NUMBER AND DISTRIBUTION OF ENLISTED MEN EMPLOYED ON BOARD SHIP, OCTOBER 15, 1914

	Number Ships	Number Men
Battleships		
Full commission	21	17,350
Reserve	3	652
Ordinary	6	548
Out commission	2	0
	— 32	—— 18,550
Armored Cruisers		
Full commission	7	5,116
Reserve	2	738
Ordinary	1	75
Out commission	0	0
	— 10	—— 5,929
Cruisers 18 knots and above		
Full commission	7	1,976
Reserve	3	574
Ordinary	1	69
Out commission	2	0
	— 13	—— 2,619
Cruisers less than 18 knots		
Full commission	6	1,625
Reserve (Naval Militia)	3	135
Ordinary	0	0
Out commission (Naval Milita)	1	10
	— 10	—— 1,760
Gunboats		
Full commission	17	1,787
Reserve	1	60
Reserve (Naval Militia)	1	32
Ordinary	0	0
Out commission (Naval Militia)	2	14
	— 21	—— 1,893
Destroyers		
Full commission	29	2,460
Reserve	19	789
Ordinary	0	0
Out commission	2	0
	— 50	—— 3,249
Destroyer Tenders		
Full commission	3	619
Reserve	1	96
	— 4	—— 715
Torpedo Boats		
Ordinary	12	98
Out commission (Naval Militia)	5	35
	— 17	—— 133

	Number Ships		Number Men	
Submarines				
Commission	32		640	
Reserve	3		14	
	—	35	—	652
Submarine Tenders (other than monitors)		2		235
Monitors				
Full commission	2		358	
Submarine tenders	3		354	
Reserve (Naval Militia)	1		49	
Out commission	2		0	
	—	8	—	761
Auxiliaries (in commission)				
Depot mine ships	1		274	
Repair ships	1		272	
Supply ships	4		447	
Fuel ships	1		182	
Ammunition ships	1		56	
Hospital ships	1		55	
Transports	4		778	
Tenders	5		513	
Surveying ships	4		508	
Seagoing tugs	14		479	
Navy yard tugs	32		320	
Fish commission ships	2		114	
Naval militia ships	18		108	
	—	88	—	4,106
Station and Receiving ships	12			846
Total number of men on board ships				41,448
Percentage of total enlisted force				79.13%

The number of men available for detail to vessels could be increased by curtailing the training course, by closing the trade schools, by abolishing navy yard bands, and by reducing the number now employed at various stations. But would the efficiency of the navy as a whole be increased by doing this? It is believed not. In the first place, the department has found it desirable to increase the lengths of the training course for apprentice seamen from four months to six months. This was done because it is considered that increased efficiency would be gained thereby. But this increase in length of the training course means that there will be approximately 1600 more men not available for detail to cruising vessels than is the case at present. This is on the supposition that there will be no immediate increase of the total allowed quota for the navy.

While it would probably be necessary to close the trade schools in war time in order to make the personnel connected therewith available for service on board ship, their continuance in peace times is most desirable and undoubtedly adds to the general efficiency of the personnel. It was necessary to close the Seamen Gunner's Class at Washington in order to obtain men to place vessels in commission when the Mexican troubles developed. This class has not been reopened, but it soon will be desirable to again open its doors.

The men on duty at hospitals, radio stations and recruiting stations cannot be decreased without affecting the efficiency of the service. In time of war we would have to augment, rather than decrease, all these details.

If the navy yard bands were discontinued, we could stop enlisting musicians for some time and thereby gain a corresponding number of men in other ratings required to man the ships.

Efforts have been made from time to time to reduce the number of men performing duties at the navy yards and stations, but it has been impracticable to effect any material reduction. This is due to the fact that certain work at the navy yards must be done, and the appropriations are not sufficient to employ civilians to do it. The result is that either the material must deteriorate or enlisted men be retained to do the work. In some cases it is desirable that seagoing men should be employed; in other cases it is not. Although some reduction can be made, the number obtained for sea service will be comparatively few unless the maintenance appropriations are increased so as to provide for the employment of civilians to do necessary work that is now being performed by the enlisted personnel.

There cannot be any material reduction in the total of 11,000 men now unavailable for detail to ships, even in time of war. This is due to the fact that although we may decrease the number of men at the training stations, trade schools, and navy yards, we must increase the number of men at hospitals, radio stations, recruiting stations; the number of patients in hospitals, and the number of men who will be enroute to and from their stations or vessels. The number of men not available for detail to vessels will not increase in direct proportion to an increase of the allowed quota; but with such an increase there will be corresponding increase in certain elements that will balance the decrease made

by sending men to sea. No matter what is done towards reducing the shore stations in time of war, we will not be able to materially decrease the total of 11,000 men, which we now have, who are not available for duty on board ship.

The proper distribution of the enlisted men among the ships and stations involves much detail work. This can readily be realized when we consider there are 290 ships in commission and 25 shore stations. In addition there are 14 hospitals, 114 recruiting stations, and 51 radio stations. The distribution would be simple if it were not for the fact that each one of the 88 ratings must be detailed to each of the ships and stations in their proper proportions. To do this there must be frequent adjustments in the various ratings in order that there be a proper ratio between them. This ratio varies according to the number of ships that are in full commission, in reserve, and in ordinary. For example, there are relatively more petty officers in comparison with non-rated men on the vessels in reserve and on those in ordinary than on the vessels in full commission. This is as it should be. Otherwise it would be difficult to furnish sufficient petty officers for a reserve ship when placed in full commission. We could not do it unless a full commission vessel were placed in reserve each time. This is the usual procedure at present.

All vessels in commission, when in United States waters, submit a weekly report of vacancies to the Bureau of Navigation. This form contains a list of all the ratings, and columns in which are shown the authorized allowed complement, the number in each rating actually on board, the number in excess, the number of vacancies, and the number for which reliefs are required within the next 30 days. These reports are used by the detail officer to determine the number of men in the various ratings that should be sent to each ship. There would be no difficulty in doing this if there were always a surplus in each rating available for detail on the various receiving ships. As we do not have such a surplus, it is impracticable to immediately furnish all ships with all the men required in each rating. There are some ratings which are seldom available for transfer. The reasons for this will be discussed later.

The receiving ships submit a daily report of men available for transfer. These reports give a list of all the ratings, and columns in which are placed the number of men in each rating available,

according to classes. These classes show the length of time to serve as follows:

Class AA; having less than three months to serve;
Class A; having less than six months;
Class B; having from six months to one year;
Class C; having from one year to two years;
Class D; having from two years to three years;
Class E; having from three years to four years.

Each training station submits a weekly report in which is shown the total number of men under training, and the number of ordinary seamen and coalpassers that will probably be available within two months, with the dates of availability. Each trade school submits a monthly report showing the number of men attending the classes, and the number of months under instruction. These reports enable the detail officer to make as equitable a distribution as practicable in accordance with the requirements of the various ships as shown by the weekly reports of vacancies.

When a number of ships are together in foreign waters it is generally found expedient to transfer a certain number of men for further detail by direction of the senior officer present, who, on account of the delay in the receipt of reports in the Bureau of Navigation, is better able to make a proper distribution.

All men on the Asiatic station are distributed by its commander-in-chief. Men for this station are sent on the army transports which sail monthly from San Francisco. The numbers in each rating to be sent are determined in the Bureau of Navigation from the quarterly reports submitted by the commander-in-chief. These reports show the status at the end of the quarter as compiled by summarizing the reports of vacancies of all vessels on the station; the number of men in hospitals; the number of men in prison, and the numbers in each rating whose enlistments expire during each of the three succeeding quarters.

The detailing of men to ships is complicated by the requirements of the various shore stations, for which suitable allowance must be made. The complements of these stations are fixed at what are considered the lowest practicable numbers to perform the duties. At many of these stations men must be detailed by name, on account of the requirements of the particular duty. Every petty officer and man should be able to perform the duties of his rating on board ship. If they cannot efficiently perform them,

they should not hold their ratings. But we cannot expect every petty officer and man efficiently to perform the unusual duties that may be assigned them at various shore stations. A chief electrician (radio) may perform his duties satisfactorily on board ship, where he is directly under an officer. The same man, if placed in charge of one of the important shore radio stations, may be found wanting in some of the qualifications necessary efficiently to conduct the stations. A chief boatswain's mate or a chief machinist's mate who performs his duties satisfactorily in every way on board a ship in commission, may be found wanting in certain qualifications which make him desirable for duty with the naval militia. Men detailed to recruiting stations must be specially well recommended as to character, neatness of dress, and ability. They must be thoroughly representative enlisted men who are enthusiastic about the service, and who have had sufficient service to indicate that they are making it a life work. The instructors of apprentice seamen; the instructors at the various trade schools, and men detailed for instruction in the trade schools must have certain qualifications that render it necessary to detail them by name. This necessity for detailing by name entails much clerical work than cannot be avoided. If there was sufficient clerical force in the Bureau of Navigation it might be desirable to increase the amount of detailing by name. But to make all details in this manner would require a prohibitive increase in the number of clerks, and would not be as satisfactory as the present rule of assigning men to ships, and in making transfers, by designating the numbers in each rating.

For several years it has been customary to detail all men of the hospital corps by name. The records of the hospital corpsmen are kept in the Bureau of Navigation and the orders are issued by that bureau; but the Bureau of Medicine and Surgery keeps additional records which enables it to make specific recommendations. This method is generally satisfactory so far as this particular corps is concerned. But there are some drawbacks. For example, an urgent order may be sent to a station or hospital to transfer a certain man or men. It so happens that one or more of the men so ordered may be sick, or on leave, or not available for some other reason. The commanding officer, having been directed to transfer a man by name, does not feel justified in making a substitution. Delay and additional correspondence results.

The detailing of radio electricians by name has recently been adopted. This has been made practicable by the Superintendent of Radio keeping records of men in the radio corps, similar to those kept by the Bureau of Medicine and Surgery for men in the hospital corps. The detail of electricians (radio) in this manner has resulted in an increase of efficiency that must be appreciated throughout the service. The necessity for adopting this method is due to the large expansion of the number of men in this branch of the service, and to the necessity of giving them the rating of electrician, which term has always applied to men who do general electrical duty. It is hoped that before long the electrician (radio) may be known by some such rating as radio operators or radiomen, both of which have been suggested. This will require legislation, as, at present, there is no provision for paying them unless they are rated electricians.

In the detailing of men to shore stations, the Bureau of Navigation recently has made efforts to distribute the shore duty more equally among all the men who desire it. A study of the enlisted men assigned to shore duty showed that many had been in the service for years and had never been to sea. It was also ascertained that some men were retained in these shore billets for personal reasons, or because their commanding officers believed that there were no other men in the service who could perform the duties so well. The retention of these men for unduly long periods on shore is not only an injustice to the men themselves, who, when sent to sea, find they are not qualified to perform the duties of their ratings on board ship, but an injustice to the large number of worthy seagoing men who desire detail to shore billets, but are prevented on account of the billet being filled by a non-seagoing man. The discontent created was made evident by reports which came to the Bureau of Navigation from various sources.

The transferring of these long-time ashore men was beset with many difficulties. Not only was political influence brought to bear in many individual cases, but some commanding officers made official and personal representations to the effect that the services of such a man could not be dispensed with on account of the peculiar or difficult duties he was performing; or that such and such a man had bought himself a house and raised a family, and that it would be a hardship to him and his family to make him go

to sea; or such and such a man had always performed his duties in a satisfactory manner, and, therefore, why remove him? Some of the representations for retention in individual cases were so insistent that one was led to almost believe that the efficiency of the whole station depended on that one enlisted man, and to wonder if the works would stop altogether should he happen to be overtaken by death.

Representations of this sort showed, as a rule, a lack of knowledge of the enlisted personnel, and an unintentional disregard for the rights of others. It is recognized that certain men can fill certain billets better than others. But there is not an enlisted man in the navy performing any specific legitimate duty for whom a suitable relief cannot be found. There are many enlisted men who have families, and who have been at sea a long time, who should not be precluded from obtaining a desirable detail ashore just because the billet is being held by a man who has brought up his family while serving on shore. Many good enlisted men are spoiled because the officers under whom they are serving lead them to believe their services cannot be dispensed with, or that there are no men capable of relieving them. Men of this class are usually found wanting when detailed to a cruising vessel or to some other duty for which they should be qualified.

Instructions issued to commanding officers of all receiving ships require them to detail suitable reliefs for those who have been on shore duty for 18 months or two years, providing men who desire these details, and who have not had shore duty recently, are available. In addition, all receiving ships must report monthly the names of men who have been on the station for 18 months or longer. This enables the Bureau of Navigation to detail suitable reliefs from men who apply for the duty when they reenlist, or from men who make requests through official channels.

There are some men in the navy who appear to forget that the more important duties of an enlisted man are on board ship and that their own personal convenience is not the main consideration in assignments to duty. When the exigencies of the service require them to go to sea, or to serve on some vessel which has a home port other than the one they prefer, or to remain on a vessel that is about to make a cruise to a foreign station, they forget that the military necessity, rather than the personal convenience, must be the first consideration. They feel that they are being discrimi-

nated against, or that they are being done an injustice if their requests for transfer are not approved. This attitude is also generally taken by their families, their friends, and their congressmen. It is unfortunate that such should be the case, as it should by recognized by every man who enlists in the navy that he must be ready to undergo some hardships and some personal inconveniences when the military necessity demands. He and his family and friends should not forget that by acquiescing in his wishes, and transferring him to some other duty, usually requires the detailing of a relief to whom the change of station may incur a greater inconvenience or hardship.

The requests for transfer made by individuals, and by their families and friends in their behalf, require much detail work on the part of the Bureau of Navigation. The amount of this work far exceeds what it should be. As the navy increases in size it will be necessary to further decrease the amount of this correspondence. The rules in approving such transfers are that the request must come from the man himself and be submitted in the prescribed form through his commanding officer; it must have the approval of this officer; there must be sufficient reason for warranting the transfer; and the services of the applicant must be required on the ship or station to which transfer is requested. If these requirements are fulfilled the transfer is authorized. If they are not fulfilled, the transfer must be disapproved, as there could be no justification in detailing men to ships or stations where their services are not required.

When members of families, friends, or congressmen request the transfer of men, they are informed that such request will be given consideration if submitted by the man himself through official channels. This is necessary to protect the man, as before this rule was adopted many requests of this sort were made without the knowledge of the man concerned, who had not made request—either because he did not desire the transfer, or because he knew there was no good reason for making a change. When a man resorts to outside influence in order to obtain a detail, rather than submit his request through the regular official channels, it is because, in 99 cases out of a hundred, he is asking for an assignment to some duty for which he is not entitled, or for which he is not qualified.

As the numerical strength of the enlisted personnel increased, the number of individual requests for transfer became so numerous it was impracticable to take action on all of them. This resulted in the submitting of hundreds of requests that were never acted on—it being the understanding that if no action were taken, the request was to be considered as not approved. Many men submitted requests simply because they were temporarily dissatisfied, or on account of some unimportant or insignificant reason. As permanency of duty is an important factor in the efficiency of a vessel, the Bureau of Navigation desired to discourage the submitting of such requests, and directed their discontinuance except in the cases of chief petty officers, and where unusual circumstances made it advisable. By doing this the hundreds of requests which were previously written and not acted on are now no longer made.

The substitution of the monthly summary of requests for transfer, in place of the numerous promiscuous individual requests, has resulted in a saving of much detail work, and a reduction of 40 letters daily, to which attention had to be given on board ship, in the department's mail distributing room, by the detail officer, and by the file clerks.

An important matter affecting the distribution of men to the various ships and stations, is the cost of transportation involved. If details were made without considering this item, the appropriation available for this purpose would be expended before half the year had passed. Receiving ships, therefore, have instructions to transfer men by public conveyance whenever practicable. This sometimes causes delay in making the transfers ordered; but such delays are considered justifiable in view of the saving to the government. Much saving of the transportation appropriation has been made by strict adherence to the rule that men who are transferred on their own request must bear the cost of transportation involved.

To distribute the enlisted personnel to the best advantage it is necessary to retain the detailing and transferring of men in the Bureau of Navigation, as far as practicable. It is also necessary that these details and orders for transfer be handled by one officer whose duty it is to keep himself cognizant of the needs and prospective needs of all the vessels and stations. He must also keep informed of the men at the various receiving ships, training

stations, and trade schools, who are, or will be, available for transfer. If these details were handled by more than one man, confusion would result. It being desirable for the detail officer to keep track of all the men, it is usually necessary to disapprove commanding officers' requests to authorize the filling of all his vacancies. The reason for such disapproval is because unless the detail officer knows the number of men in each rating that are transferred to each ship, it is impracticable for him to keep the records correct, and, in consequence, he cannot keep cognizant of exactly what men are available.

RECRUITING AND RECRUITS

Recruiting stations are maintained in various cities throughout the country. In the larger cities there are main stations, each in charge of a commissioned officer. In the smaller cities are sub-stations, each in charge of a chief petty officer who is directly responsible to the commissioned officer of the main station to which his sub-station is assigned as an auxiliary. The funds for maintaining these stations are appropriated by Congress for this special purpose, and the number of stations in operation depends on the amount of funds available and the necessity for making efforts to obtain men. In order to economize, the recruiting stations are located in public buildings when suitable space is available and if such buildings are situated so as to make it desirable. At navy yards recruiting stations are situated on the receiving or station ship. Ships in commission may always reenlist men who are discharged on board, but cannot enlist recruits unless special authority is given by the Bureau of Navigation, except when in a port where there is no recruiting station.

To each recruiting station are assigned a number of enlisted men to assist the recruiting officer. The number and the ratings of these men depend on the activity of the station and the character of the men recruited. The enlisted men consider assignment to recruiting duty very desirable. This is because it gives a respite from the arduous duties on board ship and brings with it an extra allowance for subsistence of from $1.00 to $1.50 per day. It has always been the rule to detail to recruiting duty only continuous service men with good records; and a recent additional requirement is that the men so detailed must have previously

served at least two enlistments. This insures representative men being assigned to recruiting stations.

The Bureau of Navigation has, of recent years, done more or less advertising for recruits. The amount of this advertising, like the number of recruiting stations, depending on the requirements for men and the funds available. This advertising has taken various forms—from insertions in the want columns of daily papers, to half pages in certain monthly magazines, and to the hanging of posters in public buildings—usually the post offices. In order to determine which papers and magazines are best suited for advertising purposes, recruiting officers are required to question each recruit as to what led him to apply for enlistment. These replies are periodically tabulated and summarized. From the results obtained the magazines and papers are selected. Recently there has been very little advertising owing to the quota allowed by law being practically filled.

The Bureau of Navigation has published a book, "The making of a Man-of-Warsman," which was sent to those who requested information about the navy. This book is out of print, but a new edition, different in form from the old one, is in course of preparation and will soon be ready for distribution.

The old adage that "It pays to advertise" holds true for the navy. But advertising can be overdone, and too much of it produces a bad impression on the public in general. If there were sufficient recruiting stations it would be necessary to advertise very little when conditions are normal. The navy can recruit as many men as the law allows, simply by maintaining a sufficient number of stations; the mere presence of a station in a neighborhood where desirable recruits are to be found, being the best advertisement. As an example of this may be cited the opening of new stations in Salt Lake City, Utah, and in Richmond, Va., at a time when it was desired to increase enlistments owing to the authorized quota being increased by 4000 men. The opening of each of these stations brought in an average of seven men per week, or a total for both stations for the year of about 700 men. There is no doubt that the larger part of this 700 would not have enlisted had not the recruiting station been close at hand. The conclusion drawn is that the best way to recruit is to establish as many stations as practicable, and not do any more advertising than necessary. No matter what form the advertising takes, or how

modest the inducements offered in these advertisements may be, they always produce bad impressions on some of the people. All advertising cannot be done away with because then we would not be in touch with the large number of men in the rural districts where it is impracticable to establish recruiting stations. It is from the rural districts that many of the most desirable recruits are obtained.

The facility with which men are recruited for the navy depends on a number of circumstances. As an example we might cite the Spanish-American War. At the start of the war there were less than 10,000 enlisted men. When it was over there were over 24,000 —an increase of 140 per cent. But in war times we expect the young men of the country to flock to the colors. In peace times there are not the same inducements; but any chance to participate in something unusual brings the men to the recruiting stations. Such, for example, as the trip of the battleships around the world, and the various European cruises made since that time. The mere announcement in the papers, as a news item, that such cruises are contemplated arouses interest among the young men which causes a great many to apply for enlistment. If the quota were immediately increased by 10,000 men, this additional number could easily be obtained in one year by opening 10 new recruiting stations; and in less than a year if the department announced a contemplated cruise to some foreign country or countries—provided sufficient funds were made available.

There are other things besides unusual events that affect the recruiting. Chief among these are the weather, and the industrial conditions throughout the country.

An examination of the recruiting records show that as soon as cold weather begins the recruiting picks up. This is easily explained by the fact that many men who are employed in the open find it a hardship to continue such employment in the inclement winter weather. They enlist because they have learned from friends that a man in the navy always gets three square meals a day and has a warm place to sleep. A further cause for increased enlistments in the fall is due to the fact that young men who stopped school in the spring, and who had been employed during the summer and fall, find that their work is not congenial, and they are on the lookout for something different. If they run across a recruiting station it is natural that they should step inside to see what inducements are offered.

The industrial conditions throughout the country are a big factor. The larger the number of men out of employment the larger the number of applications for enlistment. When there is plenty of work for everybody the number of men who apply at recruiting stations is below the normal. In the summer and fall of 1912 the enlisted personnel was about 6000 men below the authorized strength. This was due to three reasons: first, the fact that the allowed quota had recently been increased by 4000 men; second, because the discharges had been abnormally large due to the abnormally large number of enlistments made four years previously when the fleet made its trip around the world; and third, because of the industrial conditions throughout the country.

Every effort was made to recruit these 6000 men; that is, every effort that the funds at disposal permitted. Extensive advertising was done, but to no avail. The authorities knew that the navy was no less popular than previously, because the usual percentage of reenlistments had continued, and the policy of improving the general condition of the enlisted personnel was still in force. The reasons could be none other than the unprecedented industrial conditions throughout the country which caused the manufacturer and the farmer to seek sufficient men to work their plants, and harvest their crops, instead of the men having to look for such employment. When farmers were paying men three to four dollars per diem, and transporting them to their farms from long distances, it could not be expected that many able-bodied men were seeking the recruiting stations.

The general character of the men recruited at the present time is, as we know, very different from those recruited prior to the days of the Spanish-American War. The change has been for the better. Not that there have not always been many good men in the navy; but that in late years there have been fewer bad men—and the numbers of these latter are growing less all the time. This has been brought about by frequent changes in the Navy Regulations making the requirements of acceptance higher, and by frequent changes in the general conditions throughout the service which makes it more desirable for good men to enlist.

In 1908 a law was passed requiring all men who enlist for the first time to be citizens of the United States or of the insular possessions. Men who are not citizens, and who present them-

selves for reenlistment within four months from date of receiving an honorable discharge, must be enlisted if qualified. This exception was a just one in as much as there were some aliens who had faithfully served the country for one or more enlistments and who could not become citizens owing to interpretations by the courts of certain naturalization laws. There were a number of men who had served one or more enlistments who were eligible to become citizens, but who never had taken out naturalization papers—either because it was too much trouble, or because they and everybody else came to regard them as citizens purely on account of their service in the navy. The increased pay for reenlistment which applies only to citizens of the United States, and the decision of the comptroller that each individual must show to the satisfaction of his commanding officer that he is a citizen, has resulted in practically all foreign born men (except Asiatics and natives of the insular possessions) now remaining in service obtaining naturalization papers. At present over 96 per cent of the enlisted personnel are citizens of the United States; of the remaining 4 per cent who are not citizens, the greater part are natives of our insular possessions and cannot become citizens of the United States owing to a somewhat doubtful interpretation of the naturalization laws.

The regulations permit men to enlist between the ages of 17 and 30. In 1837 a law was passed to the effect that boys who enlist between the ages of 16 and 18 must do so for minority and have the consent of their parents or guardian. In 1865 a law was passed to the effect that no person under 16 years of age could be enlisted. In 1881 the minimum age was fixed at 14 years. These are the only laws in which ages of recruits are mentioned. As they are still effective, the regulations could be changed so as to authorize enlistments of boys as young as 14. The present limit of 17 is undoubtedly sufficiently low, as boys under this age are not sufficiently developed mentally or physically. On account of these laws all men between 17 and 18 who enlist must do so for minority. All others are enlisted for four years. This results in those under 18 years of age serving less than four years. A young man who enlists when 17 years and 11 months may complete his enlistment (by obtaining a discharge three months in advance of the regular time) in two years and ten months. Owing to the time spent at the training station he would not serve more than two

years on cruising vessels. For this reason it would be desirable to have a uniform enlistment period of four years.

The maximum age for enlistment of recruits was recently reduced from 35 years to 30 years. This was done for the following reasons: a large percentage of men who first enlisted when over 30 years of age reenlist and continue in the service, with the result that long before they complete the necessary service required for retirement they are too old for duty on board ship. In consequence, they fill many of the desirable shore billets which should be available for the seagoing personnel. In addition there is no doubt but that most of the men who first enlist after they are 30 years of age, do so because they have not been successful in civilian life. As there is no difficulty in obtaining enough recruits under 30 years of age, the reduction of the age limit from 35 to 30 appears to be a wise change. A further improvement would result if the first enlistment age limit were reduced to 25 years. As this limit is a question of regulation, it would be a simple matter in time of war, when a large expansion in numbers would take place, to place the age limit to whatever desired. This limit should not exceed 35 even then, unless it is found impracticable to recruit sufficient men who are under that age.

The regulations covering recruiting, and the instructions issued recruiting officers concerning their duties, are framed with a view to obtaining the most desirable men—mentally, morally and physically. This results in only about 20 per cent of the men who apply to enlist being accepted. The larger part of the rejections are due to physical defects; but many are due to mental deficiency and low moral standard. This scrutiny which is given every recruit produces a personnel for the navy which, man for man, is the equal if not the superior to any equal body of men of the same class in the country. The large majority of the recruits are good looking, physically sound young men, who enter the service with a view to becoming professional man-of-warsmen. That they come with this intention, and do develop into such, is a fine thing for the country. To have the personnel made up entirely of men who are in the navy because they want to be, and not because they have to be, leads to a degree of efficiency which could not be hoped for under the latter alternative.

But in spite of the care taken in recruiting we know that some "bad eggs" are enlisted. It could not be expected that this would

be otherwise where such a large body of men is involved. The remedy is to increase the scrutiny that is now given each applicant, and not to detail to a recruiting station any officer below the grade of lieutenant. It is not intended to convey the impression that some of the younger officers do not make efficient recruiting officers. All of them do not, and, when such is the case, it is not always their fault. An officer detailed to this duty should have had much experience in dealing with enlisted men. This experience enables him, in most cases, to tell an undesirable man when he sees him, or when he talks with him. The younger officers have not had sufficient experience along these lines. This results in the acceptance of applicants who are physically sound, but who are mentally and morally deficient.

REENLISTMENTS

During the last fiscal year 65 per cent of the discharged men who were eligible actually reenlisted. This percentage of reenlistments is as large as is desirable. Any increase of this percentage will be to the detriment of the service as a whole, rather than to the advantage. This may seem a remarkable statement in view of all we hear about men not reenlisting, and all that has been done to induce men to reenlist. An analysis will show the reasons for making this statement. For several years there has been no increase in the total authorized strength, and there appears to be no likelihood of such increase being immediately authorized. The reenlistments, in consequence, have been greater in proportion to the first enlistments than is desirable for the purpose of maintaining a well-balanced personnel. A majority of the men who reenlist are petty officers, or men who have not been rated petty officers because of lack of vacancies. This results in the petty officer grades being overcrowded, and the corresponding stagnation in promotion. Consequently the newly enlisted man has not the opportunities for advancement which he believed were open to him when he enlisted. Discontent is the result. This discontent leads many desirable men to purchase their discharge, as they feel that they can better their condition in civil life. Under normal conditions an average reenlistment of 65 per cent of the honorably discharged men is the proportion of old blood that is best suited for the efficiency of the service as a whole. It is better for the other 35 per cent to enter civil pursuits, where—in

the absence of a legally authorized reserve—they actually do form a potential reserve. There is no doubt but that in case of war a large percentage of these honorably discharged men would immediately enlist. They would be our most valuable asset in increasing the personnel.

A certain proportion of new blood is essential at all times. If we do not have this proper proportion the service will suffer at some future time. To make the argument clearer we will suppose that all the men eligible to reenlist actually did so. We would then be able to first enlist comparatively few men. This would result at some future date in practically the whole personnel being composed of old men. This extreme case is taken to show that there is a necessity for limiting the reenlistments.

If we find the percentage of reenlistments increasing beyond the desired proportion, how are we going to reduce it? The law requires us to reenlist every honorably discharged man if he presents himself within four months of date of discharge, provided he is physically qualified. The physical requirements are strict. Many men who present themselves for reenlistment have physical defects which, although not serious, require a waiver before the recruiting officer will ship them. The Bureau of Medicine and Surgery recommends whether or not the physical defects be waived. The Bureau of Navigation either approves or disapproves these recommendations. Last year over 500 men were reenlisted under physical waivers. By not waiving any physical defects the percentage of reenlistments would be reduced. There would also be a large reduction in the number of partially disabled enlisted men in the service, and in the number of medical surveys required. Another way to decrease reenlistments would be to decrease the amount of gratuity. Every man who reenlists under honorable discharge within four months of date of such discharge receives, in cash, four months pay. This is undoubtedly the inducement that leads many men to reenlist. If we find the proportions of reenlistments need curtailing it can undoubtedly be accomplished by removing this inducement. Aside from the question of an inducement to reenlist, this large gratuity is an expense to the government out of proportion to the benefits accrued. And this expense will increase as the navy increases. At present there are paid in gratuities approximately $900,000

annually. This $900,000 would provide the annual pay and subsistence of 1500 men if diverted for that purpose.

Not only do the men who are entitled to reenlist do so, but, unfortunately, we still find a large number of men not entitled to reenlist doing so by fraudulent means. Deserters from the army, navy, and marine corps; and men who have received dishonorable, bad conduct or undesirable discharges, are continually presenting themselves for reenlistment. Many of these men are being accepted on their oath that they have never had previous service. These men are known as "repeaters." There were more of them prior to the establishment of the finger print identification system than at present. There are many now; but their retention in the service is short lived, as, almost without exception, they are apprehended as soon as their finger print records are received in the department.

It has been found by experience that a large number of these repeaters have certain characteristics or marks, which, to a careful observer, identify them as ex-service men even without recourse to the finger print test. These characteristics and marks have been tabulated and sent to every recruiting officer with instructions that whenever an applicant is suspected of having had previous dishonorable service, his finger prints be sent to the Bureau, and the man be not enlisted until his eligibility has been passed on. In this way a large number of men who would fraudulently enlist are prevented from doing so, and the government is saved the cost of transportation, and the trouble involved in prosecuting the offender.

The number of fraudulently enlisted men detected by means of the finger print method varies from 25 to 75 each month.

The Bureau of Navigation receives over a hundred letters monthly from men not entitled to reenlist who wish to do so. When the numerical strength was below the allowed quota it was the policy to authorize some of the apparently most deserving ones to reenlist in order to give them a chance to rehabilitate themselves. Each case was handled on its individual merits. A few of those authorized to reenlist make good; the large majority do not. The effect of having such men back in the service is certainly not conducive to efficiency. At present only in the most unusual cases are reenlistments of this sort authorized.

The following table shows the number of men in service on June 30, 1914, who were serving under a second or subsequent enlistment:

Second enlistment	10,909
Third enlistment	4,529
Fourth enlistment	1,588
Fifth enlistment	745
Sixth enlistment	407
Seventh enlistment	249
Eighth enlistment	136
Ninth enlistment	47
Tenth enlistment	30
Total	18,640

This number is slightly in excess of 35 per cent of the total enlisted force; the other 65 per cent are in their first enlistment. Having so large a percentage in the first enlistment may appear to conflict with the argument previously set forth to the effect that we should not endeavor to increase the percentage of reenlistments. But there is no conflict as, by continuing to reenlist 65 per cent of the eligibles we will gradually reach a status which reverses the present ratio between men serving in their first enlistment and men serving in their second or subsequent enlistment. We are approaching this status at the rate of about 2 per cent per year as is shown by the fact that in 1907 only 22 per cent of the total force was serving in their second or subsequent enlistments.

RATINGS

There are 84 ratings for which pay is authorized by the present laws. Considering that there are two distinct classes of gunner's mates—ordnance and torpedo; two distinct classes of electricians—general and radio; three distinct classes of blacksmiths—deck, engineer and moulder; six distinct classes of yeomen—commanding officer, executive, pay, general storekeeper, engineer, and navigator—this total is increased to 114.

Many officers have advocated a decrease in this number of ratings. Some have recommended an increase. While certain of the ratings could be dispensed with, a material reduction cannot be made without a corresponding reduction in efficiency. This is essentially a time of specialization. We must have the specialist

among the enlisted men, if the efficiency of a modern ship is to be maintained in all its departments. It is recognized that electricians cannot efficiently perform both general electrical duties and radio duties. Good torpedo gunner's mates cannot maintain their necessary high efficiency unless they continually operate torpedoes. All gunners' mates could not be expected to be good turret captains. These are some of the reasons why, in recent years, the number of ratings have gradually been augmented.

If we must have men who are specialists why not call them by names which indicate the special duties they perform? By not doing so it would be impracticable to supply the ships with men required to perform specific duties. The distinction between electricians (general) and electricians (ratio) was a necessity forced upon us. The distinction between gunners' mates (ordnance) and gunners' mates (torpedoes) is a necessity which is being forced upon us. We cannot have the general term of petty officer (as some officers advocate) apply to all rated men of the seaman branch, and abolish the specific ratings which indicate the duty these men are best fitted to perform. This is because it would be impracticable to keep track of the special qualifications of every man unless the name of his rating actually indicates that specialty.

It is proposed to discuss the various ratings in detail. For this purpose the order in which they are shown on the weekly report of vacancies (Bureau of Navigation, form No. 25) will be followed, as far as practicable.

The Bureau of Navigation has recently issued an order which will eventually reduce the number of masters-at-arms to about 40 per cent of the present total. The retention of some masters-at-arms is considered necessary to conform to certain statutes and customs. Would it not be better for the service to abolish this rating all together? There is much difference of opinion on this question, not only on the part of the officers, but on the part of the enlisted men as well.

The masters-at-arms ratings should be abolished. This rating came to the United States Navy (as did many of the others) from the British Navy. It originated at a time when a special police force was necessary on account of the general character of the men in the service. The character of the enlisted man has changed

in recent years. There is no more necessity for having a special police force for the navy, than for the army or the marine corps. The mere presence of this special force detracts from the value of the other petty officers as disciplinary assistants to the officers. There is a feeling among them that it is the masters-at-arms duty to maintain discipline, and not theirs. This is not as it should be. The remedy is to do away with the masters-at-arms.

There are certain distinctive duties performed by the masters-at-arms which would have to be continued even were the rating abolished. To perform these duties the commanding officer would detail the necessary men from the petty officers (usually boatswain's mates). These details would not be permanent, but would be at the discretion of the commanding officer. If the man performing the duties of a master-at-arms is not satisfactory in any way it would simply require the detailing of him back to his division, and the selection of another petty officer to perform the duties. We would not have so many poor masters-at-arms who are now retained owing to the difficulties in changing their ratings. We would also be able to suppress that petty grafting which is known to exist, but which cannot be detected. In cases of suspicion it would only be necessary to assign the man to his regular duties with his division.

By reducing the number of masters-at-arms the number of boatswain's mates must be correspondingly increased, as the total number of men allowed each ship in these ratings is not in excess of the requirements.

The changing of the rating of coxswain to boatswain's mate third class, would be desirable. In the first place it would make the nomenclature of this branch conform to that of the other branches. In the second place the rating of coxswain is a misnomer as far as the duties performed by a majority of them are concerned. Many of them never act as coxswain of a boat. They perform only boatswain's mates duties. The time honored title of coxswain should not be done away with altogether, but should be retained to designate such men who are actually in charge of boats. The present pay table authorizes an addition of $5.50 per month for coxswains in charge of boats propelled by machinery. This should be changed so that a man in any rating who is detailed as coxswain of a boat propelled by machinery could draw the extra pay. The large steam and motor launches of the present day require expert

handling. When the commanding officer obtains an efficient coxswain he is loath to advance him in rating because by doing so he either loses his services in charge of the boat, or, if retained in the boat, the man loses the additional pay. If the rating of coxswain were changed to boatswain's mate third class, the commanding officer would then feel justified in placing his most efficient men in charge of the steamers—be they boatswain's mates first class, second class, or third class. Men would not be deprived of advancement on account of their efficiency in this particular, and we would have much more satisfactory handling of our boats.

Many recommendations have been made to completely separate the ordnance gunner's mates from the torpedo gunner's mates. To do this effectively requires a new distinctive designation for those qualified in torpedoes. Otherwise it is impracticable to keep the two classes separate. We must have a new designation such as torpedoman, or something equally as distinctive. This cannot be done without special provision being made by Congress. In the meantime the two classes of gunner's mates must be kept separated, as far as practicable, by the designations of "ordnance," and "torpedo."

The present ratings of chief turret captain and turret captain, first class, are essential.

The duties performed by the quartermasters are among the most exacting on board ship. To perform them satisfactorily not only requires a high degree of intelligence, but alertness and initiative as well. The continual watch standing adds the element of drudgery to the duties of this important rating. The result is that the quartermaster's ratings are not usually filled, and there are seldom men in these ratings available for detail on the receiving ship. The men prefer to become boatswain's mates, or gunner's mates, instead of quartermasters. Ships which have gunner's mates, boatswain's mates, and seamen in excess of complement continually request that quartermasters be sent. This in spite of the fact that the excess men in other ratings have been advanced on board. There are usually no quartermasters to send, for the reason that practically all ships are the same in respect to this rating—they do not make them. In order to relieve the situation the complements of quartermasters on board all vessels has been increased—the increase being in the higher ratings. It is hoped that this will lead more men to aspire for ratings in this branch.

If this plan is not effective the only remaining alternative will be to increase the pay of the quartermasters, so that it will be slightly in excess of the pay of the boatswain's mates and gunner's mates.

Numerous recommendations have been made advocating the rating of "helmsman." We have come to recognize that on a vessel having from one hundred to two hundred seamen, all cannot be trained to become efficient helmsmen. Some readily acquire the art; others can never learn. However, it is essential that a certain number of men on every ship be expert in steering. There are certain ones who are always called on when special care must be taken. It is not believed desirable to create a new rating for these men, but it does seem that men who are specially proficient as helmsmen should have additional compensation while so detailed. Gunpointers, signalmen, and others now receive such additional compensation. The efficient helmsman on whom much reliance must be placed should not be neglected.

The term "ordinary seaman" is a misnomer. It must be anything but a source of gratification to those men who hold the rating. It is suggested that the designation be changed to seaman, second class, as more appropriate.

The introduction and expansion of the use of radio telegraphy has necessitated the formation of a corps of operators. These men are rated electricians (radio) to separate them from the electricians (general). In order to maintain the distinction between them it becomes necessary to detail all radio electricians by name. As the instructions issued by the Bureau of Navigation require general and radio electricians to perform only the duties indicated by their designations, it would simplify matters if the electricians (radio) were given an entirely distinctive designation. The ratings of "radio operator" and "radioman" have been suggested. The latter is probably better owing to its conciseness. In order to make the designation operative, and to provide a rate of pay, congressional action will be necessary. It would be equitable to make the pay the same as that now provided for electricians.

If the warrant grade of electrician should be established, the enlisted men's ratings of chief electrician, and electricians first, second and third class, would, of necessity, have to be changed to chief electrician's mate and to electrician's mate, first, second and third class, respectively.

Although this paper is not a discussion of the warrant officers, it becomes necessary to refer to them, in order to bring out certain points. The present designations of chief carpenter and carpenter should be changed to chief artificer and artificer as being more indicative of the duties performed. If this were done then the present rating of chief carpenter's mate should be changed to chief artificer's mate. The duties of a chief carpenter's mate require a general knowledge of the various artificer trades. Carpentering is not the only trade he should be familiar with. He should have knowledge of shipfitting, plumbing, blacksmithing and painting, as well. In other words, his title should indicate his duties. By changing the rating to chief artificer's mate an incentive would be given to the artificers (other than carpenter's mates) to qualify for this higher rating, with the resultant increase in efficiency.

In 1908 Congress passed a rider on the appropriation bill fixing the pay of the enlisted men of the navy at its present rate, plus 10 per cent. Previous to this the rate of pay had been fixed by the President. The result is that at present the pay table is a composite of some statutes and many executive orders. There are many anomalies in it which can now be corrected only through congressional action. Some such legislation would be of benefit to the service owing to the discrepancies which now exist. These discrepancies are more manifest in the various artificer branches than in the others. This is due to the fact that, as the modern man-of-war developed, it was found advisable to add additional ratings and fix a rate of pay that would be sufficient to insure the enlisting of qualified men. These rates of pay when once fixed were never changed, except by the act of Congress above referred to, which made an increase of 10 per cent to all of them.

Let us analyze these rates of pay as now authorized for the artificers who are serving in their first enlistment:

The monthly pay of a boilermaker is	$71.50
The monthly pay of a machinist's mate first class is	60.50
The monthly pay of a shipfitter first class is	60.50
The monthly pay of a coppersmith is	60.50
The monthly pay of an electrician first class is	55.00
The monthly pay of a blacksmith is	55.00
The monthly pay of a plumber and fitter is	49.50
The monthly pay of a carpenter's mate first class is	44.00

It will be seen that a boilermaker on first enlistment receives more pay than any other artificer under the same conditions. This pay is even higher than that of most of the chief petty officers. This high rate of pay has resulted in an over supply of boilermakers, many of whom are unsatisfactory. Consequently no boilermakers are now being enlisted, and their enlistment has been discontinued for some time.

No man's pay should be reduced except for just cause, and the pay of boilermakers now in the service should not be altered. But it would be advisable to enact legislation authorizing boilermakers, first class, at a monthly pay of $60.50, and boilermakers, second class, at a monthly pay of $44, which is now the rate of pay for shipfitters, second class. Boilermakers should be enlisted only in the second class rating and be required to show their efficiency by actual service on board a cruising vessel before being rated first class. If this were done there would not be as many incapable boilermakers as we have at present.

Although the pay of the coppersmith is now $60.50 per month, it has been difficult to obtain sufficient men in this rating. This is not due to the inadequacy of the pay, but to the fact that the coppersmith's trade is not so extensive as that of the boilermakers. Efforts are now being made to increase the number of coppersmiths by detailing more men to the coppersmith class at Charleston. The efficiency of coppersmiths could be increased by having first and second class, and requiring men to qualify for first class by satisfactory service in the lower rating.

The pay of electricians, first class, should be increased to $60.50, placing the men of this rating on the same footing as that of machinist's mates first class. At present nearly all ships are short of the allowed complement of first class electricians. This condition is due to not enough electricians reenlisting to keep the grade full. It can be remedied in two ways: first, by increasing the pay so as to make an inducement for the men in this branch to reenlist; second, by making continuous service one of the requirements of entrance to the electrical school. If this latter were done we would then educate our electricians from the men who reenlist with the intention of remaining in the service. Now we are educating a large number of landsmen for electricians, who, owing to the demands for men in their trade in civil life, do not reenlist on account of the better pay they obtain.

Additional classes have recently been formed in the electrical schools for the instruction of continuous service men. Should it be found that sufficient men of this class qualify to fill the service requirements, it will be practicable to gradually increase the qualifications a recruit must possess in order to enlist as landsman for electrician. Eventually enlistments in this rating could be discontinued. We would then educate as electricians only those who may reasonably be expected to remain in the service.

Instead of having only one rating of blacksmiths there should be two ratings—first class and second class. This change is recommended for the same reasons making it desirable to have two ratings for boilermakers, coppersmiths, and shipfitters.

The rating of plumber and fitter should be dispensed with. The shipfitters should be required to qualify as plumbers.

The pay of the carpenter's mates should be increased so as to place these men on an equal footing with the other artificers. When we consider that a shipfitter first class now gets $16.50 per month more than does a carpenter's mate first class, there is no difficulty in tracing the cause for the lack of men who desire to become carpenter's mate. They naturally prefer to become shipfitters, and endeavor to qualify in that rating solely on account of the increased pay. The pay of carpenter's mates, first class, and carpenter's mates, second class, should be the same as is allowed for shipfitter's first class, and second class, respectively. The pay of carpenter's mate, third class, should remain as at present, and the rating of shipwright be done away with as it is unnecessary.

As the duties of the printers and painters are dissimilar to those performed by the other artificers they were not included in the previous table.

The printers are discriminated against in the question of pay. There is only one class of printer and the pay per month is $38.50. There should be two classes of printers, and their pay be on an equality with that of the artificers, *i. e.*, $60.50 per month for printers, first class, and $44 per month for printers, second class.

Two classes of painters are sufficient for the service requirements. The present third class could well be dispensed with. The pay of the painters should be the same as that of the other artificers.

As there are no more sails and no more sailmakers, the rating of sailmaker's mate should be dispensed with. As certain unusual

qualifications are required for men who take charge of the hammocks, bags, and other canvas on board ship, there should be a provision authorizing extra pay for the men assigned to this duty. They would be on the same status, as far as pay is concerned, as is now the case of men assigned to duty as captain of the hold and as jack-of-the-dust.

Chief machinist's mates with acting appointments receive the same pay as those holding permanent appointments. This rating, and that of chief commissary steward, are the only chief petty officer's ratings in which this is so. It would be better if there was a difference in pay for the acting appointment and the permanent appointment, as is the case with other chief petty officers. The difference should be made by a reduction of the pay of those who may hereafter be given acting appointments, rather than in an increase for those holding permanent appointments. At present a chief machinist's mate may serve under acting appointment indefinitely and never be subject to the examination required for permanent appointments. As he gets the same rate of pay under the acting appointment there is no incentive for him to obtain the permanent appointment, other than the immunity from being disrated by his commanding officer. The result is there are proportionately more chief machinist's mates serving under acting appointment than is the case with any other chief petty officers, except commissary stewards. The necessity of taking the examination for permanent appointment in order that an increase of pay could be obtained would result in increased efficiency.

It has been found desirable to rate a number of men blacksmith (moulder). They must be called blacksmiths in order to draw pay. If it is necessary to have men for this particular duty, they should have a distinctive title to identify them. For this reason we should provide for the ratings of moulder, first class, and moulder, second class, with the same grades of pay as that for blacksmith, first and second class, respectively.

The only other change recommended for the artificer's branch is to change the rating of coalpasser to that of fireman, third class. Not only is the title of coalpasser one that carries with it little dignity, but the use of oil is becoming more prevalent. There is no use for a coalpasser on an oil burning ship.

The pay of yeoman, first class, should be the same as for the first class ratings of the artificer branch. The same status exists

in regard to first class yeomen as we find with the first class electricians. We are continually educating a large number of landsmen for yeomen, many of whom do not reenlist, either on account of the pay of the yeoman, first class, not being sufficient, or because they are able to obtain employment in civil life which brings them better compensation. The remedy, as in the case of electricians, is to educate more continuous service men and fewer first enlistment men, and to increase the pay of the first class rating. Classes for continuous service men have recently been established in the yeomen schools with a view of remedying the present shortage in yeomen, first class.

The men of the hospital corps should receive a nomenclature and compensation which would place them on the same footing as other enlisted men. Instead of having hospital stewards, hospital apprentices, first class, and hospital apprentices, we should have "chief pharmacist's mates, pharmacist's mates, first class, and pharmacist's mates, second class." We could enlist men as landsmen for pharmacist's mate in the same manner in which we enlist landsmen for other ratings. They would not be rated pharmacist's mate, second class, until they qualified in the service school which has recently been established for hospital apprentices.

The same thing applies to chief commissary stewards as to chief machinist's mates in regard to the pay for acting and permanent appointments. Chief commissary stewards with acting appointments should not receive the same pay as those holding permanent appointment.

The rating of ship's cook, fourth class, could well be dispensed with. Three classes of ship's cooks are sufficient for all practicable purposes.

There are too many ratings in the messman branch. Instead of having the five different ratings for cooks and stewards there should be but two: cabin stewards and cabin cooks; officer's stewards and officer's cooks, would be sufficient. The cabin stewards and cooks could be assigned to flag officers, commanding officers, and wardroom officers. The officer's stewards and cooks could be assigned to junior officers and warrant officers.

The changes of pay recommended are such that are believed would better the general efficiency by equalizing where such adjustment is desirable or necessary. Decreases are recom-

mended for boilermakers, and for men holding acting appointments as chief machinist's mates, and chief commissary stewards; such decreases not to be effective in cases of men who already hold the ratings, but only to apply to those who may hereafter be appointed.

Increases of pay are recommended for quartermasters, first class, electricians, first class, carpenter's mates, first class, blacksmiths, printers, and painters, first class.

CHIEF PETTY OFFICERS, PETTY OFFICERS, AND NON-RATED MEN

As there is a limit to the total number of men allowed, and as there should be a proper balance between the various ratings, it has been found necessary for the Bureau of Navigation to issue instructions tending towards the retention of this balance.

The Navy Regulations provide for the filling of vacancies by authorizing the commanding officers to issue acting appointments where such vacancies exist. In some cases it is necessary to curtail the issuing of such appointments. In other cases it is found desirable to authorize their issuance in excess of complement. In order to determine which ratings require curtailing, and which ones require augmenting, it is necessary to make a summary, from time to time, of the number of men in excess of, or short of each rating as provided for in the complements of all the vessels in commission. These summaries are made from the last reports of vacancies of all vessels and shore stations on hand in the Bureau of Navigation. They show that the conditions continually change and that some ratings, which are in excess at one time, are short of requirements at other times. On the other hand it is found that some ratings are always more or less in excess and other ratings are always more or less short. The reason for the excess in such cases is either because the requirements for acquiring the rating are not sufficiently stringent, or because the pay of the rating is high in comparison with that of some other ratings, the duties of which are as difficult, or even more difficult, to perform. The shortage of men in certain ratings is due to the pay being not sufficiently high to induce men to try for advancement to those ratings, or because the duties required are more arduous and difficult than required of some other ratings. The excess may

also be caused by the reenlistment of an unduly large number of men in certain ratings, while the shortage is caused by the failure of a proper proportion of men in certain ratings to reenlist. It can readily be seen, therefore, that if there were no regulation in this matter, the balance would be so affected as seriously to interfere with the efficiency of the service as a whole. If we actually have more men in certain ratings than are required for the proper manning of our ships, we must, under the present conditions (where the number of ships in commission is kept to the full limit that the authorized strength of the enlisted personnel permits), actually be short of men in certain ratings which are also essential to properly man these same ships. It is for this reason that hundreds of recommendations made by commanding officers to rate men in excess of complement must be disapproved.

Four years ago it was ascertained that chief masters-at-arms, chief boatswain's mates, and chief watertenders were much in excess of service requirements. It then became necessary to issue instructions prohibiting the advancement of men to these ratings, except on approval of the Bureau of Navigation. These instructions were in force for two years when it was deemed expedient to lift the embargo, and authorize the advancement where vacancies existed. These ratings have again become more numerous than required.

In recent years there has gradually become an excess in most of the chief petty officer ratings. Consequently it has become necessary to prohibit all advancement to any of these ratings except on approval of the Bureau of Navigation. This will enable the excess men to be gradually assigned to other ships and stations as vacancies occur. When the excess is reduced sufficiently the rating of men will be authorized by the bureau, the men being selected from an available list after careful consideration of their records. This should gradually increase the general efficiency of the chief petty officer ratings. There is no question but that at present some men are rated not solely on account of their proficiency, but simply because there is a vacancy and they happen to be available. About 80 per cent of the chief petty officers are really efficient in their ratings. About 20 per cent are only mediocre or indifferent. These latter should not hold their ratings, especially as they prevent worthy men from being advanced.

The statement that 20 per cent of the chief petty officers are not efficient is not made haphazard, but is made from a knowledge of the many complaints that are made to the Bureau of Navigation in regard to these men. Reports are made concerning this chief petty officer being too old to properly perform his duties; or that chief petty officer being generally inefficient; or here is a chief petty officer who is unfit for duty every time he returns from liberty; and there is a chief petty officer who is incompetent. Commanding officers appear reluctant to disrate such chief petty officers, even when they hold acting appointments. They prefer to transfer them to some other vessel where another commanding officer may suffer the inconvenience of having them on board. A majority of incompetent chief petty officers are not found among those holding acting appointments, but among those holding permanent appointments. This is because when a chief petty officer receives a permanent appointment, he is assured of his position so long as he does not commit himself sufficiently to warrant a court martial. He may be as negative or indifferent as he pleases. That so few of the chief petty officers show this indifference speaks well for the general high character of these men. The large majority of them continue to give the government their best efforts in spite of there being no further reward than that of a clear conscience which goes hand in hand with duty well done. How, in justice to these honest men, and in justice to the service at large, are we to rid ourselves of the comparatively small percentage of chief petty officers who are content to perform their duty indifferently while they remain secure behind their permanent appointments? If we come down to cold hard facts, the proper method of dealing with these men would be to discharge them as undesirable. But commanding officers are naturally reluctant to make such recommendations in cases of men with long service.

There is only one remedy—that is to require every chief petty officer who holds a permanent appointment to take an examination every third or fourth year. This examination should be similar to that which he had when he received his permanent appointment. His record during the preceding years should be carefully scrutinized. A chief petty officer who fails to pass this examination should be reduced to the next lower rating. If this policy

were adopted it is believed there would be necessity for comparatively few reductions. But there would be an incentive for those who are now indifferent to keep a good proficiency record with the corresponding benefit to themselves and to the service.

The causes for lack of sufficient men in certain ratings such as quartermasters, electricians, carpenter's mates, and coppersmiths; and for the tendency to acquire excesses in certain other ratings, such as boilermakers and shipfitters have been previously discussed, and may be laid to the pay table or to the conditions in civil life.

At present the greatest shortage is in the rating of coalpasser. This is due to the necessity of nearly all our coalpassers being rated from the apprentice seamen who complete the course of training at the various stations. To become coalpassers they must have certain physical qualifications that are not required for ordinary seamen. The ratio of the men having these physical requirements is not in proportion to the ratio between the coalpassers and ordinary seamen in the service. Also a large number of apprentices who have the physical requirements do not elect to become coalpassers, either because they prefer the seaman branch or because they do not like the title of coalpasser. Consequently the ordinary seamen greatly exceed the coalpassers, with the result that where many vacancies exist on board ship, as at present, the greatest shortage is in coalpassers. In order to remedy this condition the Bureau of Navigation has authorized commanding officers to change the ratings of seamen and ordinary seamen to coalpassers if they are physically and otherwise qualified.

As the number of oil burning ships increases the necessity for coalpassers decreases, so the shortage which we now feel will gradually adjust itself. It is even probable that before many years, when practically all vessels in commission burn oil instead of coal, the additional physical requirements now required of firemen will no longer be necessary, and we will have a preponderance in the lower ratings of the fireroom force instead of in the seaman branch.

The last annual report of the Chief of Bureau of Navigation shows that there were 18,557 petty officers and 34,110 men in other ratings in the service on June 30, 1914. It also shows that

there were in the service on the same date 18,640 men serving in second or subsequent enlistment, and 34,027 men serving in first enlistment. The similarity between these figures is noticable. The percentage of petty officers is the same as the percentage of men serving in second or subsequent enlistment. The percentage of men serving in their second or subsequent enlistment is gradually increasing. If the percentage of petty officers increases likewise where will the limit be, and should there be such a limit? There must be a limit somewhere or else we will become overburdened with petty officers and we will be short of the non-rated men. In fact that condition is already beginning to assert itself. There are more vacancies now among ordinary seamen and coalpassers than in the higher ratings. Of course we can limit the number of petty officers by increasing the requirements for advancement, or by curtailing advancement. This does not seem to be a good solution as it will not be conducive to efficiency to close the avenues of promotion to those that are worthy. The only other solutions are in a gradual increase in the personnel and in the adoption of the proposed bill which provides for a naval reserve composed of ex-service men. At least there will be a solution if the men with twelve to twenty years service will accept transfer to the reserve instead of reenlisting in the regular service. Most men with this amount of service are now reenlisting if they are physically sound. If they will take advantage of the opportunities offered by the reserve bill in case it becomes a law, it will do a great deal towards relieving the congestion in many of the petty officer's ratings.

What is a petty officer? According to Webster a petty officer is "an enlisted man, appointed by the commanding officer, who exercises authority over such enlisted men as are at a given time and for a given purpose placed under his command." If this definition is accepted as correct, it must be inferred that a number of ratings in the navy which are now classed as petty officer ratings, are not really such, and that the men who hold these ratings should not be petty officers. There are fifty-seven petty officer ratings at present. There should be not more than half as many. But where should the line be drawn as to who are and who are not petty officers? If we draw the line so that the definition given by Webster is followed we will not be far from wrong.

Below is given a list in two columns of all our petty officers. In column 1 are those which are really petty officers in accordance with the duties they perform. In column 2 are those which are termed petty officers's ratings, but which should not be so.

1	2
Chief master-at-arms.	Gunner's mate, second class.
Master-at-arms, first class.	Gunner's mate, third class.
Master-at-arms, second class.	Electrician, second class.
Chief boatswain's mate.	Electrician, third class.
Boatswain mate's, first class.	Carpenter's mate, first class.
Boatswain mate's, second class.	Carpenter's mate, second class.
Coxswain.	Carpenter's mate, third class.
Chief gunner's mate.	Shipfitter, first class.
Gunner's mate, first class.	Blacksmith.
Chief turret captain.	Plumber and fitter.
Turret captain, first class.	Sailmaker's mate.
Chief quartermaster.	Printer.
Quartermaster, first class.	Painter, first class.
Quartermaster, second class.	Painter, second class.
Quartermaster, third class.	Painter, third class.
Chief electrician.	Machinist's mate, second class.
Electrician, first class.	Boilermakers.
Chief carpenter's mate.	Coppersmiths.
Chief machinist's mate.	Oilers.
Machinist's mate, first class.	Yeomen, first class.
Chief watertenders.	Yeomen, second class.
Watertenders.	Yeomen, third class.
Chief yeoman.	Hospital apprentice, first class.
Hospital steward.	First musician.
Bandmaster.	Ship's cook, second class.
Chief commissary steward.	Baker, first class.
Commissary steward.	
Ship's cook, first class.	

The men who hold ratings enumerated in column 2 do not exercise authority over other men any more than does a seaman exercise authority over an ordinary seaman if they happen to be working together. For this reason they should not be classed as petty officers. It is not necessary to change the titles of their ratings. They should be retained as at present.

Eliminating the masters-at-arms, and reducing the number of petty officers by one half, would undoubtedly have the effect of making the remaining petty officers much more efficient in main-

taining discipline. They will soon learn that, in addition to the distinctive duties required by their respective ratings, they all have the common duty of assisting the commissioned officers in maintaining discipline. The efficiency of the navy as a whole must be benefited when we cease to enlist recruits as petty officers, which is now done in such cases as boilermakers, coppersmiths, plumbers and fitters, and several other ratings. To take a man who has never had any military training, and who knows nothing of military discipline, and make him a first class petty officer on the very day that he enlists is an anomaly that is hard to conceive has been permitted to exist for so long a time. In fact the title of petty officer means nothing to such men, as they cannot possibly realize its significance. Nor do the other men realize it. In order to have them realize it we must have the title of petty officer signify something more than only a name.

Many complaints are made by officers to the effect that the petty officers do not efficiently perform their duties as such—that they cannot be relied upon to maintain discipline. Where this is the case it is not the fault of the petty officers, but the blame should be placed on the system as above referred to, or to the lack of proper training at the hands of the commissioned officers under whom they are serving. The efficiency of all branches and grades of the enlisted personnel depends entirely on the training received at the hands of the commissioned personnel. If the petty officers are not efficient it is for the commissioned officers to provide ways and means for making them so. They will undoubtedly respond to any effective ways and means that are provided.

Suggestions have been made to the effect that a substitute should be found for the term "petty officer." The reasons given are that the word "petty" has many meanings which can be applied in a derogatory sense. If the term is abolished we would probably have to substitute the word "non-commissioned," unless someone can suggest something better.

DESERTIONS AND DISCHARGES

The number of desertions has steadily decreased from 9 per cent in 1908 to 2.9 per cent in 1914. This decrease in desertions is due to the gradually improved conditions that make service in the navy desirable, and to the improved quality of the enlisted per-

sonnel in general. It probably will be impracticable to ever reduce the desertions below 2 per cent. The reasons for this are—first: in spite of the liberal policy pertaining to discharges by purchase, and in spite of the increased number of undesirable discharges that are authorized, there are bound to be a certain number of men, in so large a body, who either do not realize the meaning of the oath, or who temporarily forget its significance when some temptation to remain away from their station presents itself. After remaining away for a certain length of time they fail to return on account of the fear of the consequences. Second: there will always be some men who desert because of the fear of the consequences due for infractions of discipline; third: there will always be a certain number who, on account of their moral turpitude, will be forced to desert by their shipmates.

The liberal policy adopted in recent years in authorizing commanding officers to discharge men as undesirable has undoubtedly reduced the number of desertions by ridding the service of a certain element that composes the class who desert.

Whether or not the recent liberal policy of authorizing discharges by purchase will reduce the number of desertions remains to be seen. It is probable that the class of men who will take advantage of the privilege to purchase discharge is not the class from which desertions are apt to occur. Consequently there will not be a material reduction in desertions on this account.

The change in regulations relating to discharges by purchase will undoubtedly have a beneficial effect on the service, provided certain restrictions are made. It will be necessary to make a number of restrictions as soon as the new regulation has been long enough in force to show where such restrictions are desirable. The Bureau of Navigation has already issued instructions that men who complete a course in any of the trade schools are not eligible to purchase their discharges during their current enlistment. This rule was made in order that the government may get adequate return for the time and money spent in conducting these schools. The same rule should apply to men who are especially trained in other duties for which they receive extra compensation. Such, for example, as in the case of gunpointers. These men require much personal attention on the part of the commissioned officers to insure their proper training. If they make good they are given additional compensation. The govern-

ment is entitled to their services on account of the care and time spent in their training. Therefore, they should not be eligible to purchase their discharges. Hereafter no man should be trained as a gunpointer except with the explicit understanding that he is not eligible to purchase his discharge during his current enlistment.

A number of men have requested discharge by purchase even when they have not the available funds, or any prospect of obtaining such funds in the near future. A number of men have also requested discharge by purchase even when they really have no idea of immediately taking advantage of the privilege. They simply want the authority to sever their connection with the service at any time, and at their own convenience. There should be some restrictions that will prevent these promiscuous requests. It is suggested that no man be authorized to submit a request for discharge by purchase unless he first deposits the purchase price with the paymaster. It is further suggested that every man whose request is approved be required to accept discharge within five days of receipt of the approval on board ship. If such discharge is not accepted within that time, the approval should be cancelled. It is manifestly not conducive to discipline to have a number of men with approved requests for discharge remaining on board ship for their own convenience.

Careful consideration should be given requests for discharge by purchase in cases where it is evident that the reason for submission is to avoid duty. Every enlisted man should have his share of the disagreeable and arduous duty that must be performed. Discharges in cases where the only reasons are to avoid such duty, should not be authorized.

RETIREMENTS AND PENSIONS

The only retirement law, at present, provides that if a man, after 30 years service, makes application to be placed on the retired list, his request shall be approved, and he shall receive, when so retired, 75 per cent of the pay of his rating. In computing service for retirement, the Spanish war service shall be counted as double time.

There are no provisions of law or regulations which definitely fix the status of an enlisted man when once placed on the retired list. He keeps the Bureau of Navigation informed of his address

so that his monthly pay check may be forwarded to him. Otherwise he has no connection with the service, and is able to enjoy his well-deserved rest without molestation. Whether or not a retired man may be required to perform duty in case of emergency is a question that should be definitely settled. There is no record of any retired man ever having been so employed.

There has been a sentiment throughout the service for some time, that the retirement law for enlisted men is not broad enough in its scope. The requiring of 30 years service before a man can be retired, is not only a hardship on the man, in many cases, but it is a hardship on the entire service. Owing to the active duty now required on board ship, most men become incapacitated for duty long before they reach the retiring age. It would be unfair to discharge them after 25 years service. They would fail to reap the reward that should go with that length of service. On the other hand it is unfair to the service to have to retain a large number of men who are incapable of efficiently performing their duties, simply on account of their age. This is especially true now when the active services of every authorized man are required, and the retention of each superannuated man excludes the enlistment of a younger man. The length of service required in order that a man may retire on three-quarters pay should be fixed at 25 years.

We have heard much, and read much, about graded retirement. There should not be any retirement for less than 20 years service, and only such men with 20 years service should be retired who on account of their age or their physical condition are not suitable for duty with the naval reserve for which the department has recently recommended enactment of law.

This naval reserve bill, as recommended to Congress for passage, provides that enlisted men with 12, 16 or 20 or more years service, who are transferred to the reserve shall be paid at the rate of one-fourth, one-third and one-half, respectively, of the base pay, plus permanent additions thereto, which they were receiving at the close of their last service in the navy. This provision takes the place of graded retirement, and practically gives the enlisted personnel the advantage of such retirement, while at the same time it gives the government a guarantee on their services should conditions make it desirable.

As this reserve is being formed in order to provide suitable trained men for active service in case of war, it is essential that

all men in the reserve should be qualified to perform this duty. We must be careful to insure the reserve being composed only of such men. Otherwise its real value as a reserve loses effectiveness.

It is for this reason that a retirement law for men with 20 years service is advocated. There will probably be a number of men with this length of service who are too old or decrepid to warrant their transfer to the reserve. Such men should be able to retire on half pay, rather than fill the ranks of the reserves with men who cannot reasonably be called upon to perform active duty.

Every man with 20 years or more service who is discharged by reason of physical disability incurred in the line of duty, receives a pension equal to one-half of his pay. Men with less than 20 years service who are discharged for physical disability incurred in the line of duty receive a pension as provided for in the pension laws. The amount of this pension depends on the degree of the disability.

Although these pensions laws are for the purpose of adequately providing for the men who are disabled in the government service, there has been a tendency in the navy to retain men disabled in the line of duty, rather than to discharge them. There are a number of such men now in the service, and they are retained owing to the supposed hardship that will be imposed in case they are discharged. The retention of these men for sentimental reasons is not justifiable, especially as every man in the service should be available for active duty. There should not be a man in the navy in time of peace who could not be effectively employed on board ship in time of war. If the laws do not provide adequate pensions for those disabled in line of duty, they should be amended so as to make sufficient provision. The cost of providing for such men should not be borne by the navy which requires every available cent now authorized to maintain it in an efficient condition. The money appropriated for the navy should not be used in any way that does not lead to increased efficiency. By using some of it to pay disabled men we are not spending the money to the best advantage.

PAY AND ALLOWANCES

The pay of the enlisted men on first enlistment varies from $17.60 per month for apprentice seamen and landsman, to $77 per month for chief petty officers holding permanent appoint-

ments. In addition to the regular pay of his rating each man receives either a ration in kind, or the commutation therefor at the rate of 30 cents per day. The average cost to the government of the ration in kind, as issued at present, is 37 cents per day, per man.

As the extra pay and allowances allowed for reenlistment and for special details are well known, that feature will not be discussed. However, it may be of interest to know that a number of chief petty officers receive pay and allowances that aggregate more than $100 per month. In some cases it even reaches $125. For example, the case of a chief gunner's mate serving on board a submarine will be given:

Pay of permanent appointment as C. P. O.	$77.00
Additional pay for two reenlistments	8.80
Additional pay for seaman gunner certificate	2.20
Additional pay for serving on a submarine	5.50
Additional pay for submerging	16.50
Value of ration in kind at $.45 per diem	13.50
Additional pay for three good conduct medals	2.46
Total monthly pay and allowances	$125.96

To show that this is not an exception, the case of a chief boatswain's mate serving at the recruiting station, New York City will be given:

Pay of permanent appointment as C. P. O.	$77.00
Additional pay for two reenlistments	8.80
Additional pay for seaman gunner certificate	2.20
Additional pay for four good conduct medals	3.28
Subsistence at $1.50 per diem	45.00
Total monthly pay and allowances	$136.28

These high rates of pay are not common, of course, but the examples are given to show the possibilities for the men, even if they do not eventually become warrant or commissioned officers.

During the past year the average monthly pay of all the enlisted men in the navy was a few cents over $41. To this should be added the average monthly cost of the ration, which is $11.25 per man, making the total average of pay and allowances $52.25. On first enlisting each man receives clothing to the value of $60. When we consider that men are provided with lodgings, and that

their clothing costs comparatively little, we must conclude that the enlisted men are adequately compensated. They have free medical attendance in case of illness, and the provisions of the pension laws to rely on in case of disability incurred in the line of duty. If they remain long enough in the service they may retire on three-quarters pay. We must conclude from this, that they are better off than are men in civil life who engage in that class of work which may be considered similar or parallel to that performed by the enlisted men.

Although the compensation is adequate for most ratings, it is believed that there should be slight increases in certain ratings as suggested under a previous heading. If such increases are to be authorized, it could best be done by revising the entire pay table to take the place of the present law which has as its basis a conglomerate mass of statutes and executive orders.

THE ENLISTED MEN'S DIVISION OF THE BUREAU OF NAVIGATION

The enlisted men's division of the Bureau of Navigation is in charge of a commissioned officer, and has assigned to it one officer as assistant. In order to handle properly the large amount of correspondence and other matters that concern the enlisted men, the division is divided into seven sub-divisions as follows:

Complements, Details, and Transfers.
Recruiting.
Transportation.
Identification.
Retirements and Pensions.
Statistics and Filing.
Correspondence.

The officer in charge signs the mail which is prepared in the various sub-divisions. This mail varies from 300 to 500 pieces daily. The wide variation is due to the movements of vessels. When the larger part of the fleet is away from the United States there is a noticeable falling off in the amount of mail received.

The various sub-divisions prepare all routine mail for the officer in charge's signature prior to his acting on it. However, there is a large amount of mail, other than routine, that the officer in charge must act on personally before replies can be prepared. There are also many letters from various sources which recom-

mend or request that exceptions be made to the regulations or to the bureau's instructions. All such letters must be handled personally by the officer in charge.

It is the duty of the officer in charge to carry out the policies of the Chief of Bureau and to keep him informed in regard to all matters relating to the enlisted personnel.

The assistant to the officer in charge personally handles all matters pertaining to complements of ships and stations, details of men to ships and stations, and transfers of men between ships and stations. Details to ships and stations, and transfers between ships and stations, were discussed under the sub-head of "Distribution." The scheme for making out complements for vessels is based on certain rules which experience has shown are most satisfactory. It is recognized that these complements do not provide all the men that would be required in case of war. Many officers continually make recommendations for changes in complement on the vessels on which they are serving. These changes are generally for an increase; seldom for a decrease. Officers serving on vessels of the same class make recommendations that conflict. It is generally necessary to disapprove recommendations of this sort, as even if complements were increased, there are not, at present, sufficient men to fill them. To authorize an increase that cannot be provided would cause more discontent on board ship than to have a complement which can be kept filled.

When complements are originally made in the Bureau of Navigation, every phase in connection with them is considered. The number of men required to man the guns and torpedoes; the number required for fire control, signalling, and for first aid duty; the number of engines, firerooms, auxiliaries, boilers, and the amount of grate surface; the number of special details and cooks required; and the necessary proportion of petty officers to enlisted men in the various branches, are all considered in making up each complement.

All sub-divisions, other than the one under the assistant to the officer in charge, are in charge of clerks.

The recruiting, transportation, retirement and pension, and identification sub-divisions, handle all correspondence relating to their respective offices.

The statistical and filing sub-division is one of much interest. In these offices are kept the statistics in regard to enlistments, dis-

charges, desertions, etc. The various interesting tables in regard to the enlisted personnel which are found in the annual reports of the chief of Bureau of Navigation, are compiled in this office. The compiling of this data involves a systematized scheme, the result of over 50 years experience on the part of the clerk in charge.

The record of each enlisted man is kept in a heavy paper envelope called a "jacket." On the front face of each jacket is a blank form with a space for the name, and four columns for entering each change of duty or rating, date of change, rate of the man, and the vessel or station to which transfer is made, or on which serving.

Each recruiting officer is furnished with a supply of these jackets. When a recruit enlists the man's name is entered in the place provided on the front face of the jacket. In the first line of the first column is entered the letter "E," which signifies "enlisted;" in the second column is entered the date of enlistment; in the third column the rate in which he enlisted; and in the fourth column the vessel or station to which transferred. The original shipping articles are then placed inside the jacket which is mailed to the Bureau of Navigation. The finger prints of the recruit are classified in the identification office, and the classification entered on the shipping articles, which are retained in the jacket which is then filed alphabetically in the cases provided for this purpose. Thereafter all correspondence which concerns this man is filed inside his jacket, and when transfer or change of rating is involved, proper entry is made in the columns provided on the face.

The filing cases for these jackets occupy the entire walls of two large rooms, and reach from the floor to the ceiling. There are a total of over 2900 filing boxes, each capable of holding approximately 60 jackets, making it practicable to keep close at hand the records of about 175,000 men. The records of the men who are actually in the service are kept in what are known as the "live" files, the boxes of which are those that can be easily reached. The records of men who have been discharged, or who have deserted or died, are kept in the "dead" files, the boxes of which are close to the floor and near the ceiling. As soon as the report of a discharge, desertion, or death is received, the man's jacket is moved

from the live to the dead files. If the man reenlists or surrenders the jacket is replaced in its proper place in the live files.

As both files are arranged alphabetically it is a question of only half a minute to obtain the record of any man. This alphabetical filing also eliminates the necessity of giving file numbers to the large amount of correspondence relating to individuals.

To the correspondence sub-division belongs all extraneous matters not belonging to the other sub-divisions. This is the largest sub-division and handles approximately as much mail as all the other offices combined. This correspondence relates to the ratings and the preparation of permanent appointments; the preparation of continuous service certificates; providing for and issuing good conduct medals; the preparation of rewards for deserters, and the correspondence in connection with the disposition of the deserters when apprehended; the correspondence between the Bureau of Navigation and the Judge Advocate General in regard to courts-martial; letters of inquiry from outside sources as to whereabouts of men; letters of inquiry from outside sources as to details and transfers; letters of complaint in regard to non-payment of debts, and non-support of families; and all matter not otherwise provided for.

CONCLUSION

The history of the United States Navy, from its beginning to the present time, shows that the enlisted men have always risen to the occasion when emergency demanded, and that they have always performed their duties under trying circumstances in a most exemplary manner. This is true, not only in war times, but also in times of peace when numerous occasions have arisen which demanded the enlisted men to show their mettle. As examples may be cited the several disastrous explosions which occurred in the turrets of various vessels during target practice. The manner in which the men conducted themselves on these occasions have been announced to the service in general orders, and a number of them received medals of honor in recognition of their heroic performance of duty.

It should be borne in mind that the men, who, on these occasions, conducted themselves so heroically, were not picked men in any sense of the word; they were what we might call the "run

of the mine." For this reason, we must conclude that the "run of the mine" is of a high standard.

The efficiency of the enlisted personnel is what the officers under whom the men are serving make it. It being conceded that the material with which we start is of excellent caliber, it remains for us to see that this material is developed and trained so that each ship of the navy reaches the highest possible degree of battle efficiency.

There are certain laws and regulations which must be observed in developing this efficiency, and it is our duty as officers, in cases where we consider such laws and regulations a handicap to the proper development of the personnel, to make recommendations to that effect, so that there may be no hindrances in the way of producing battle efficiency.

We frequently find two ships of the same class, which have been furnished with crews from the same source, maintaining a different efficiency standard. On one ship the crew is contented and efficient; the vessel shoots well, steams well, and performs all other duties required of it in a most exemplary manner. On the other ship we find a discontented and an inefficient lot of men. The ship is near the bottom of the list in the target practice competition and the steaming trials, and there are many desertions. The officers on the inefficient ship blame it on the crew. They complain that they received an undesirable lot of men. The complaint is unjustifiable. They received the same class of men as those sent to the efficient ship; but they have failed to properly develop and train the men received, and, as a result, the crew is inefficient. The other vessel has taken the same class of men, and by properly training and developing them, has produced an efficient ship.

With the material we have, all of our vessels should be efficient. If they are not so the blame cannot be justly laid on the enlisted personnel, as these men will respond, to proper training and discipline.

To retain the high standard of efficiency which the enlisted personnel has reached we must be careful not to forget that the navy is a military organization. Strict discipline must be maintained. The bulkhead between the officers and the enlisted men must not be demolished, if we are to maintain this discipline. A military organization without discipline becomes a mob. This fact is well known to the good enlisted men who recognize the

necessity for maintaining discipline. The type of enlisted man who does not like military discipline, and who chafes under the restraint, is not suited for the navy. We do not want them, and should get rid of them.

If we wish to keep the enlisted personnel contented—and contentment and efficiency go hand in hand—we must avoid making to them promises which it is impracticable to fulfill. They must not be led to believe that they are to have opportunities which cannot, in practice, be given them. They should be taught to understand that service in the navy requires some sacrifices and the endurance of some hardships. There is no source of discontent more virulent than that which makes a man believe he is entitled to something more than he is actually receiving.

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SALVAGE OPERATIONS ON SUBMARINE *F-4*

By Naval Constructor J. A. Furer, U. S. Navy

On the morning of March 25, 1915, at about 9.15, the U. S. S. *F-4*, commanded by Lieut. A. L. Ede, U. S. N., in company with submarines *F-1* and *F-3*, stood out of Honolulu Harbor for a submerged run. The quartermaster of the war-bound German steamer *Holsatia*, which was lying at anchor just outside of the harbor entrance, watched the *F-4* submerge, while heading toward Diamond Head. That was the last seen of the vessel.

The other two submarines returned to the harbor shortly, but when the *F-4* had not returned by 10.30 a. m. the officer of the deck of the tender *Alert* became alarmed and reported the fact to the commanding officer. A fast motor boat was promptly dispatched to search the harbor fairway for any signs of the vessel. Soon afterward the other three submarines and all the power boats of the *Alert* were sent out to join in the search. In the meantime, also, men had been stationed to listen in on the submarine signal sets of the *Alert* and of the other vessels. This watch was kept for days, but not the slightest sign of life was ever received from the lost vessel.

Shortly after 12 o'clock one of the motor boats came across quantities of air bubbles and an oil slick on a range approximately between Diamond Head and Barber's Point, about a mile and a quarter from the channel entrance. The chart gives 200 fathoms of water in this locality. Had the *F-4* been lying in this spot there would have been no use in attempting to bring her to the surface. However, the air bubbles seemed to come from in-shore, which left some hope that the vessel might not lie too deep for assistance. Only a few hundred yards in-shore from the locality of the air bubbles, soundings gave a depth of about 300 feet. This was encouraging and led to the conclusion that the vessel must be in shallower water than indicated by the first bearings.

Chief Gunner's Mates Agraz and Evans from the submarine flotilla made a descent near the air bubbles to a depth of 190 feet without reaching bottom and without seeing anything of the *F-4*. These men went down under helmets only—this as a matter of choice—because of the somewhat greater facility in coming to the surface in case of accident to the air supply. This depth was later exceeded by Agraz, who went down to 215 feet under a helmet alone. A descent to this depth with air supplied by pump is probably a record. Depths of 306 feet were later on reached by divers working in regulation suits and using compressed air.

With the vessel submerged to a depth of at least 300 feet, as seemed probable, the only chance of saving any lives was to drag the craft into shallow water, so as to make it possible for the divers to work. This could have been accomplished only in case the battery and machinery compartments of the submarine had not been filled with water. With these spaces filled with water, her weight would have been about 260 tons. There was, of course, not the slightest possibility of dragging any such weight in-shore and up hill. To have made no attempt at dragging would, however, have meant giving up at once all chance of saving the lives of the crew, because no lifting gear could be improvised and made fast at this depth within the time available for rescuing the men.

A sweep was accordingly made as soon as the situation appeared in this light. This sweep consisted of two 110-fathom wire hawsers, with 45 fathoms of chain in the middle. The two ends of the sweep were taken to the tugs *Navajo* and *Intrepid,* respectively. The first drag was made at about 8 o'clock, the evening of the accident. Dragging was continued throughout the night. Every little while the sweep fouled on the bottom giving the rescue party the momentary hope of having caught the submarine—only to pull loose again.

Toward 11 o'clock the following morning, March 26, the tugs made a hard strike with the sweep. The catch held fast, but no progress could be made toward shore.

A second tug was placed on the bow of each of the dragging vessels, so as to increase the power, and so as to keep the two main units apart, as they had a constant tendency to come together. The combined efforts of all four tugs failed, however, to move the catch.

As an aid in exploring the ocean floor, and for determining the location of the submarine, a microphone had been constructed on the *Alert* during the night. This apparatus consisted of two sounding leads, strapped together. Into the bottom of each lead a nail was driven. Electric conductors were connected to these nails and fitted to a telephone receiver. Dry batteries furnished the current. On bridging the two nails with a metallic object the circuit through the telephone receiver was completed—recording a click on making and breaking the contact. This outfit was used for sounding over the area where the submarine was thought to be. By means of this microphone the submarine was definitely located and the position plotted. This position checked with the location as indicated by the direction, length and angle of the sweep lines leading to the tugs. On the following day the sweep parted and brought to the surface a piece of brass from the conning tower fair-water. This left no doubt as to the location of the vessel.

The fact that the tugs could make no headway in towing left the situation hopeless, so far as rescuing the crew was concerned. Nevertheless, it was decided to try the only remaining chance of lifting the vessel with a moderate upward pull. A dredge was accordingly brought to the scene and a wire rope sling dropped to the bottom. After many difficulties, and after bringing an old anchor to the surface—which was at first thought to be the submarine—a 1⅜-inch wire hawser was finally swept under the vessel. The two ends of the hawser were taken over the stern of the dredge and heavy purchases were rigged for heaving it in. A second wire hawser was swept around the other end of the vessel. By heaving in on the sling leading to the dredge, and by towing on the sweep, it was hoped to work the vessel in-shore. No progress could, however, be made. The lifting hawser finally parted, when it had been subjected to the full load which it was capable of carrying, that is, about 100 tons. There was now no question that the vessel must be practically full of water and that nothing short of lifting her clear of the bottom would be successful in bringing her in.

No ready-at-hand salvage gear was to be had in Honolulu. This was, however, not a particular handicap, because none of the usual salvage methods could have been followed, in any case, due to the great depth of water in which the vessel lay. The only

suitable appliances in Honolulu, of sufficient strength to carry the suspended weight of the submarine, were two mud scows, belonging to a local dredging company. These scows were 104 feet long by 36 feet beam by 13 feet deep, having four mud pockets, each about 24 feet by 13 feet at the top and 11 feet by 13 feet at the bottom.

In view of the weight of the submarine—260 tons—and the fact that the working loads would be live loads because of the swell, it was obvious at once that at least four slings, made from

FIG. 1

the heaviest cables procurable, would be needed. It was decided to place two slings under the submarine at about one-fourth the length from the bow and two more in a similar position aft. Two windlasses were installed on each scow, as shown in Figs. 1 and 2. Each windlass wound up one sling.

It was necessary, first, to provide beams of sufficient strength, to span the mud pockets, in order to carry the very large, concentrated loads coming on the windlasses. A storage plant for coal was at the time under construction at the naval station, Pearl Harbor. In the structural material a number of 30-inch I-beams, of almost exactly the right length to bridge the pockets, were

found. Five of these beams were laid across the two center pockets of each scow, as shown in the photograph. Heavy angle-irons were bolted across the I-beams to prevent racking. The I-beams were in addition secured to the coamings by drift bolts. The windlass drums were made from sugar mill shafts, which were found in stock at one of the machine shops in Honolulu. The shafts selected were 13 feet long by 14⅝ inches in diameter. In order to reduce the working stresses on the shafts as much as possible they were supported by three pillow blocks secured to the

FIG. 2

I-beams. The pillow blocks were specially cast, at a local foundry, for this purpose.

How to apply the power for winding up the slings, with their heavy loads, was at first a problem. Gearing such as is ordinarily used on winches and other winding machinery was ruled out, because of the time involved in its construction and because of complications in its design. A winding spool, slipped onto the square end of the shaft, was the solution. By passing five turns of a 1⅜-inch wire hawser around the spool by hand, and then unwinding by power, the necessary turning effort was applied. The lead of the winding rope from the spool to a triple purchase by

way of the large sheave at the side of the scow is shown in Fig. 1. The end of the winding rope was fitted with a socket, secured to a pin riveted between the face-plates of the spool. Two dead turns were left on the spool to reduce the stresses on the pin.

The most powerful hoisting engines available fell far short of the necessary pull to wind up the load without multiplying the purchase. The diameter of the winding spools was made 50 inches and, as the effective diameter of the shafts was about 15 inches, a leverage of approximately three to one was obtained in this manner. The triple purchases to which the winding ropes were led gave a further multiplication of power of six to one. These triple purchases were rove up with $\frac{3}{4}$-inch wire rope led direct to the drums of the hoisting engines. There was, however, only one engine available of sufficient power to take care of the load with even this purchase. In the case of the other scow, a luff was necessary to further increase the purchase by two to one. Friction was a very large portion of the load which the hoisting engines had to overcome.

The construction of the winding spools was one of the most bothersome features of the design, because of lack of manufacturing facilities. A steel casting plant was not available for making these spools. Cast iron could not be trusted, as the stresses to which the spools were subjected in service were very great. They were, therefore, built up solid of steel plates. The core was made of ten $\frac{1}{2}$-inch plates, in the absence of any heavier available material. For the cheek-plates $\frac{3}{4}$-inch material was used. All were riveted together, and the core lined with Douglas fir. A square hole was slotted in the center, for slipping onto the square end of the shaft.

A locking pin was provided for each spool, to keep the shaft from turning while the spool rope was being re-wound. The locking pins were 6 inches in diameter, made of nickel steel. Four locking-pin holes were bored in each spool. When in use, the ends of the pin rested on two pillow blocks secured to the I-beams, as will be seen from the cut in Fig. 3. The entire weight of the submarine had to be carried by the locking pins when the winding ropes were slack, as was necessarily the case during the re-winding process. This part of the gear, and for that matter all of the gear, had to be made sufficiently strong to carry not only the dead load, when equally distributed between the two scows, but also at least one-half the weight of the submarine under live

load conditions brought about by the motion of the scows in the swell.

The length of the scows fixed the number of feet of lift which could be obtained without re-winding the spool ropes, because it limited the travel of the running blocks of the triple purchases. Three complete turns of the windlass shafts brought the triple purchases block-and-block. The windlasses then had to be locked, the purchases overhauled, and the spool ropes re-wound. This was the procedure on the scow having the more powerful engine. On

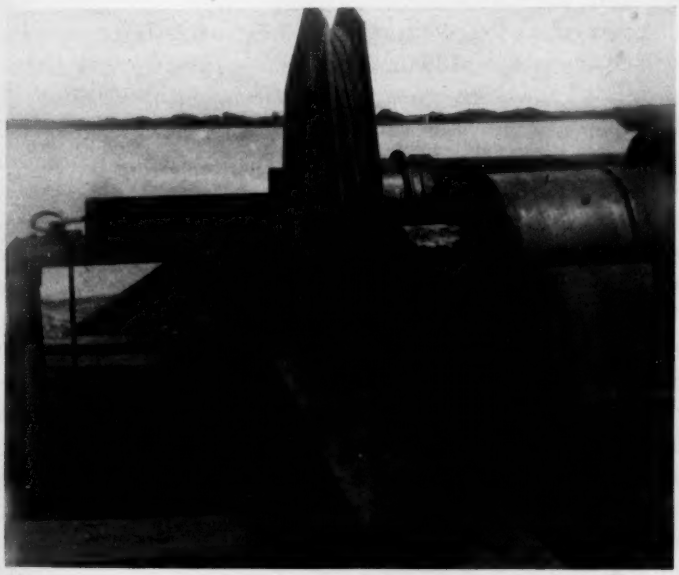

FIG. 3

the other scow, because of the additional luff, only one-half turn of the shafts could be obtained between fleets. While this method of lifting promised to be very slow, when the design was being evolved, it proved to be an insignificant item in the total time of the salvage operations. On one occasion, the submarine was lifted 58 feet in less than two hours, after all the preliminary work of getting ready to lift had been completed. The preparatory work of placing the slings, securing the lifting hawsers, etc., took 21 days.

In order to keep the windlass shafts from rolling out of their bearings when the lifting hawsers were in certain positions, it was

necessary to fit U-bolts around the journals at the winding spool ends. These U-bolts served the same purpose as the top bearings on a winch shaft. The tendency of the shafts to roll out of the bearings existed, of course, only when the windlasses were locked during the fleeting operation. If the shafts could have been locked at both ends, at a radius from the center of the shaft greater than the radius of the line of action of the lifting cables, there would have been no such tendency. But, this was not feasible without going to much undesirable elaboration in the construction of the mechanism.

The two ends of each lifting sling were made fast to the windlass shafts by means of hook bolts. These bolts were 2½ inches in diameter. Two holes were drilled through the windlass shaft close to the journals, one for each bolt. By bringing the end of the cable under the hook, and setting up on the nut at the other end of the bolt, the hawser was squeezed down on the shaft and held by friction. To further prevent the hawser from pulling through, cable-clamps were secured to it, close to the hook bolt. Three dead turns were also wound up on the shaft before taking the strain.

Two steam-driven pumps were installed on each scow, so that, in case it should be found necessary to use more power for breaking the submarine away from the bottom than available in the hoisting engines, buoyancy could be called on to help out. A flood valve was fitted in the bottom of each scow. With the load suspended from the windlasses, it was desirable not to resort to this method of lifting, because of the unstable condition of the scows when partly filled with water. Timber cribbing was fitted around the lifting hawsers in the bottom of the mud pockets, so as to counteract the upsetting moment due to the negative metacentric height under these conditions. One of the scows had to be flooded, on one occasion, in order to relieve the strain on a jammed windlass shaft, but otherwise it was not found necessary to resort to flooding and pumping.

To have employed the pontoon method of raising the vessel would have been extremely slow, if at all possible, because of the limited tide, about 1½ feet in this locality. This method is efficient only where there is considerable rise and fall of tide. With a small tide, practically all of the difference between high and low water is lost in taking up the slack which remains, no matter how taut the

lifting hawsers are hove up at low water. Even the difference in draft of the scows, when flooded and when dry, would have given only a small lift at each shift.

Lead blocks had to be specially constructed for the winding spool ropes, as no suitable standard equipment of sufficient strength was available. The provision of adequate deck fastenings for these blocks presented considerable difficulty. For this purpose, U-shaped steel plates were fitted under the 12-inch by 12-inch deck stringers, with the ends of the plates projecting up through the deck. A steel pin was fitted through the eyes of the U-plate, to which the lead block was shackled. The fastenings were reinforced against the upward and forward pull, to which they were subjected, by wire rope tourniquets leading to the side keelsons. The location of the blocks had to be quite exact, in order to keep the spool rope clear of the I-beams and of the mud pocket coamings. One of the blocks is shown in the foreground of Fig. 1.

A dredge, from which the boom and bucket gear had been removed, was used as the central unit of the salvage plant. This dredge was selected because it was equipped with a 10-inch by 14-inch engine, geared to 6 drums, any one of which could be operated independently of the others. After sweeping the lifting hawsers under the vessel, the ends were taken to the dredge and hove in, by means of the drums, to the extent desired, before transferring them to the scows. The gearing between the engine and the drums was such that a pull of as much as 25 tons could be applied to the hawsers. The drum facilities were constantly called on to work the lines under the submarine to the desired positions. The dredge was anchored by the stern with a long scope of wire line. This line also led to a drum. Once the first hawser had been swept around the submarine, and the ends had been transferred to the dredge, the craft was effectively moored fore and aft. By heaving in and slacking off on the anchor line and on the hawser pendants the dredge could be easily moved at will. The dredge also furnished electric lights to the scows and water for the hoisting engines.

While the scows were being equipped, search was being made for hoisting cables of requisite strength for lifting the submarine. Steel hawsers of such size are not ordinarily carried in stock by manufacturers, because they are so infrequently called for that they are made up only to fill special orders. A $2\frac{5}{8}$-inch diameter

plough steel cable was found on the Island of Hawaii, where it had been used for ferrying machinery across the gulches during the construction of a railroad along the Hamakua coast. Several 2½-inch diameter galvanized steel cables were obtained from the Pacific Mail Steamship Company. Galvanized steel hawsers are not, however, so suitable for work of this kind as plough steel hawsers, because the former chafe more easily. If four plough steel cables, 2⅝ inches in diameter, such as the one mentioned above, had been available, it is quite possible that the vessel might have been brought into the harbor at the first attempt. A 2-inch plough steel cable was obtained from the coast, but had, of course, a breaking strength far inferior to the large cable mentioned.

Simultaneously with the beginning of the work on the lifting appliances, the Navy Department started a party of divers from New York to take passage at San Francisco on the *Maryland*. The Bureau of Construction and Repair had been conducting tank experiments at the navy yard, New York, for some time, on deep-sea diving. This was the first practical test of what could be accomplished under service conditions.

The divers arrived on April 12. By that time, the lifting gear had been completed and installed on the scows, the dredge had been anchored near the submarine, and two hawsers had been swept under the vessel.

On April 14, one of the divers was sent down to survey the situation below, and to observe the location of the lines. He reported that the vessel was lying right side up, listed slightly to starboard, and heading approximately toward the channel. Neither of the lines was found to be in the position desired. The lines were accordingly shifted by the tugs, and a diver was again sent down to make an observation. Both lines were this time reported to be located as intended.

It was soon realized that the divers would not be able to do manual work at this great depth, because they could remain on the bottom with safety only a very short time—from 10 to 15 minutes. Work at a depth of 300 feet is much more exhausting than work near the surface, although the diver, while below, is not conscious of the extra physical strain. This was demonstrated in the case of one of the men, who remained on the bottom 30 minutes trying to pass a small manila reeving line—the only actual manual work at this depth which was attempted. According to this diver's state-

ment, he was not conscious of becoming fatigued while on the bottom; but, after coming to the surface, he collapsed from exhaustion, and did not regain his strength for three or four days—notwithstanding the fact that the man was a perfect physical specimen. Even though the divers could do no work at this depth, their services were invaluable in reporting on the condition below. It would have been impossible to place the lines in the positions intended without their observations as a guide.

FIG. 4

Air was supplied to the divers from charged torpedo flasks, the pressure being controlled by a reducing valve and by throttling. These flasks, together with a recompression chamber which was brought from the New York Navy Yard, were installed on a coal lighter. The diving was done from a small float made fast alongside either the dredge or the lighter. The greater part of a day was always needed for making a dive, because of the necessity of bringing the diver back to the surface very slowly, and because other operations had to be suspended to prepare for diving. In no case was a line pronounced finally satisfactory as to location until it had been inspected by one of the divers. The arrangement of the lighter, dredge and diving float are shown in Fig. 4.

As soon as the two forward lines were reported to be suitably located, they were transferred to one of the lifting scows. This was done by the aid of an anchor barge equipped with a double drum hoisting engine and a derrick frame. One drum carried a single ¾-inch wire runner leading over a sheave at the derrick frame head. The other drum was rove up as a double purchase—also by way of a sheave at the derrick frame head. A light manila line was, first of all, fished up through the mud pocket of the scow. To the end of this line the ¾-inch wire runner was secured—the anchor barge having first been placed alongside of the scow opposite the central pockets. By hauling away on the manila line which had been taken to the dredge, and paying out on the runner, the latter was brought to the dredge, where it was shackled to the end of the lifting hawser. A pendant leading to one of the drums of the dredge engine was kept shackled into the end of the lifting hawser, until the transfer had been successfully made. By paying out on the dredge pendant, and taking in on the anchor scow runner, the hawser was brought up through the mud pocket and over the windlass shaft.

Before making fast under the hook bolts of the windlasses, the slack was taken out of the slings by the combined use of the falls and of the runner of the anchor scow, in a manner similar to hauling up a rope hand-over-hand. It was necessary to take most of the slack out of the cables; otherwise, the resulting dead turns would have taken up too much valuable space on the windlass shafts. After the slings had been hauled up taut, they were slacked back again just enough to bring three dead turns on the windlasses. The cables were then made fast, by means of the hook bolts, and cut off by an oxy-acetylene torch.

The anchor scow lines were clapped onto the slings by means of chain stoppers. Practically all the handling of these heavy wire hawsers was done by chain stoppers, as it seldom happened that the ends of the hawsers were so conveniently located as to permit shackling the hauling pendants directly into the eyes. The chain stoppers found most convenient for all-around use were 11 feet long, made of ⅞-inch open link chain. A large pear-shaped link, 10 inches by 5 inches in the clear, was welded into one end. At the other end a smaller link of the same shape, which could be passed through the larger link, was fitted. The small end link was made of such size as to accommodate a 2½-inch shackle pin.

By April 18 all four lifting hawsers had been placed and finally transferred to the scows. The difficulties in handling the heavy hawsers, fishing them up through the mud pockets and securing them to the shafts were very great. This will be more readily appreciated when the weight and stiffness of a 2⅝-inch plough steel cable is taken into consideration. Such a cable, of the length used on this job, weighs about seven tons and is not much more flexible than a bar of iron. In perfectly smooth water, the job would have been comparatively easy, but as there is always some swell outside of Honolulu harbor the motion of the scows and of the other floating equipment brought violent and sudden strains on the gear, and frequently rendered the work of the men dangerous.

By the time the last sling had been placed, the strength of the first hawser had been considerably impaired by chafing underneath the submarine, due to the constant motion of the scows in the swell. After lifting only about 12 feet, the first cable carried away, where it passed around the bilge of the vessel. Bad weather set in and made it impossible to replace this cable promptly. After it had been replaced, another lift was made. Rough weather was again encountered, and presently the other cables carried away, one at a time. Altogether, a lift of 25 feet was accomplished with the wire hawsers.

After just one month from the date of the accident, there was not a line under the submarine, and the only progress made was a lift of 25 feet with the vessel about 150 feet further in-shore. The situation was, however, not so discouraging as this slight progress might indicate, because the adequacy of the scows and of the gear for lifting the submarine had been demonstrated and the feasibility of getting lines under the vessel at this depth had been proven.

In view of the rapid impairment of the cables by chafing, it was decided to place a 15-fathom shot of chain in the middle of each sling where it passed under the submarine. For this purpose, the *Maryland's* 2⅝-inch stud-link anchor chain was used. Fitting up the four slings in this manner involved considerable work, as eye-splices had to be made in the heavy wire pendants for shackling them to the chains. The broken hawsers were used for the pendants. There was, of course, the likelihood that chain would

damage the hull of the submarine—at least to a greater extent than wire hawsers; but, from the experience gained it was now certain that wire hawsers would not resist chafing for a sufficient length of time to permit salving the vessel.

While the new slings were being prepared, an air compressor was installed on the dredge for blowing water out of the submarine in case lightening the vessel should prove necessary. It was decided, however, not to attempt the air connection except as a last resort, because of the great difficulty which the divers would

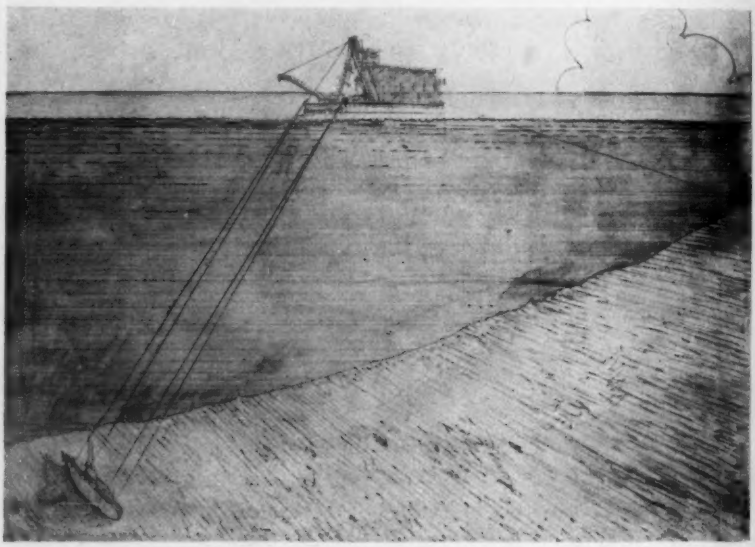

FIG. 5

experience in doing the work even at 275 feet—the depth in which the submarine now lay. With the vessel in shallow water, there would have been no difficulty whatsoever in making this connection. Subsequent events made it unnecessary to connect the salvage line, as the lifting capacity of the gear proved adequate, as it had theretofore.

The method followed in sweeping the wire hawsers under the submarine could not be used for placing the new slings, because of the tendency of a bight of chain to drag out straight when hauled over the ground. The procedure adopted consisted of anchoring the dredge by the stern near the submarine, as before.

The tugs then swept a $1\frac{3}{4}$-inch diameter wire hawser under the bow of the vessel. Both ends of this hawser were now transferred to the dredge. A second wire hawser was swept around the stern. The ends of this line were also taken to the dredge. These hawsers, together with the dredge anchor, not only moored the craft, as shown in Fig. 5, but by their direction and angle of descent gave a fairly accurate indication of the location of the bow and stern of the submerged vessel. The arrangement also made it

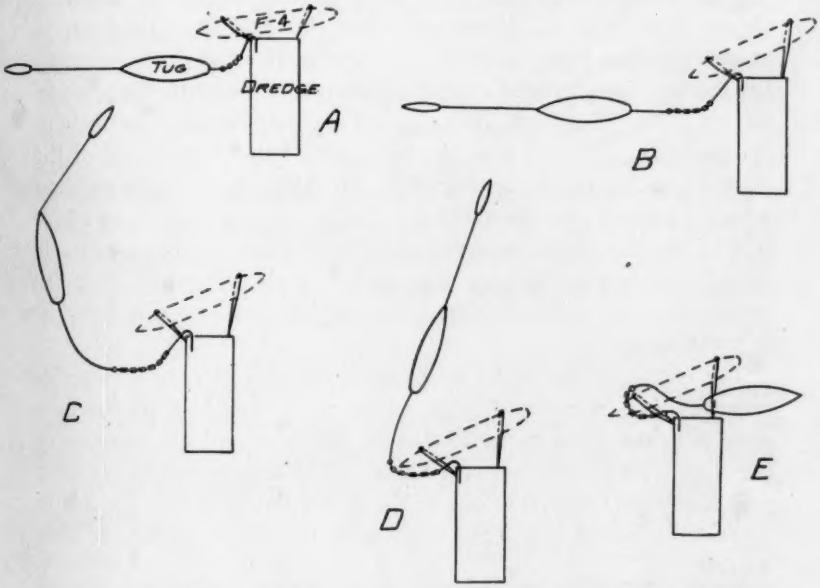

FIG. 6.—Method used in Sweeping Chain and Cable Sling under Submarine

possible to shift the dredge easily by taking in or paying out the drum pendants.

The new slings were marked at intervals of five fathoms from the middle—this in order to assist in placing the chain portion of the sling evenly under the vessel. The slings were fleeted down on a coal barge and taken alongside the dredge. One end of the sling was then transferred to the dredge and the eye shackled to one of the drum wires. The other end was transferred to the tug *Navajo,* being shackled to the vessel's towing hawser. The chain was now thrown overboard from the coal barge. A small tug passed a line to the *Navajo's* bow, as shown at *A,* Fig. 6. As soon

as the sling was overboard, the tugs steamed ahead slowly in the direction shown at *A*, so as to straighten out the chain in front of the submarine. This had to be done carefully, in order not to take the chain off the bottom; otherwise, the angle of the pendant from the dredge might have become so great as to sweep the chain over the top of the vessel. This happened several times, but was partly due to the fact that the exact position of the submarine could not be predicted from the lead of the marking hawsers.

The *Navajo* then paid out her tow line and went ahead as shown at *B*, Fig. 6. When sufficient line had been paid out to ensure the sling lying on the bottom and in front of the submarine, the leading tug changed course and hauled around to the position shown at *C*. The catch, if the sweep was successful, was made as shown at *D*. All this time the behavior of the dredge end of the sling was being carefully observed. By taking hold of the pendant where it passed over the end log of the dredge, any strain or vibration of the line could be detected. Thus, when a catch was made as at *D*, the fact was at once indicated, and when the chain began to render through under the submarine the jump of each link could be felt distinctly.

The extent to which the slings were towed under the submarine was directed from the dredge, as the angle and lead of the lines gave a fairly accurate indication of the fore and aft location of the sling with reference to the vessel. The dredge end of the sling was always so secured to one of the drum pendants that the length when taut would bring the middle of the chain under the submarine.

By observing and feeling of the cable pendant, the failure of the chain to render could be quickly detected. When no further progress could be made by towing, the tugs were signaled to stop and the *Navajo* was directed to pay out about five fathoms of line. A corresponding length was then hove in on the dredge. This having been done, the tugs were again signaled to go ahead, and the drum wire paid out on the dredge. In this manner the sling was rendered into its final position.

When, from the length of the pendant leading to the dredge and from its direction and angle of lead, it appeared probable that the chain was about even on both sides of the submarine and in the desired location, the tugs were stopped and the *Navajo* brought to the position shown at *E*, Fig. 6, by heaving in on her

tow line. When the eye of the pendant had been brought over the rail of the *Navajo,* it was transferred to the dredge by means of one of the drum lines. The tow line of the *Navajo* was, of course, kept fast until the transfer had been successfully made.

Two slings were placed under the forward end of the submarine, with comparative ease, but great difficulty was experienced in getting lines under the stern, because the rudder and one propeller were buried in the sand. One of the scows was finally brought out and the forward lines transferred to it. By lifting about 150 tons, the bow of the submarine was raised sufficiently clear of the bottom to permit sweeping the other two slings from forward aft. One of the after lines could not, however, be brought into an altogether suitable position. This line proved, eventually, to be the indirect cause of the unfortunate termination of the first phase of the salvage operations. As the angle of lead of this sling was quite satisfactory for the depth in which the vessel was lying, it was considered advisable to allow it to remain until shallower water was reached, rather than to attempt the very difficult task of shifting it to a better position at that time.

After working 21 days, often for 24 hours at a stretch, everything was again ready for a lift on May 20. These 21 days represented the time taken to prepare and place four slings under the submarine. The difficulties and discouragements met with are too numerous to mention. While dragging the slings into place, it was hard to keep the tugs on the desired course, for the wind and sea threw them off and frequently rendered them unmanageable. As the maneuvers called for little headway, but much change of course and heavy towing, the rudder was of little use to the *Navajo.* Therefore, entire dependence had to be placed on the leading tug for keeping direction.

Several days were lost on account of picking up an anchor and other gear. This occurred while sweeping one of the marking hawsers to locate the stern of the submarine, preparatory to placing the slings. When the anchor was caught, an effort was made to heave it up to the dredge and to clear it from the hawser. It was found, however, to be fouled with other gear which made it necessary to tow the dredge and the entire catch into the harbor under a big crane, so that the tangled mass might be cleared away. This was done with some difficulty. The catch consisted of two

anchors, two shots of chain, an old wire hawser, a buoy, and several small lines.

After completing the task of placing one of the after slings, the chain broke, due to a defective link. This involved a loss of two days. Chain stoppers carried away on several occasions, allowing the ends of hawsers to go overboard, and bad weather frequently interfered with the work.

When everything was again in readiness for lifting, the tugs were placed ahead of the dredge. The wire hawsers leading from

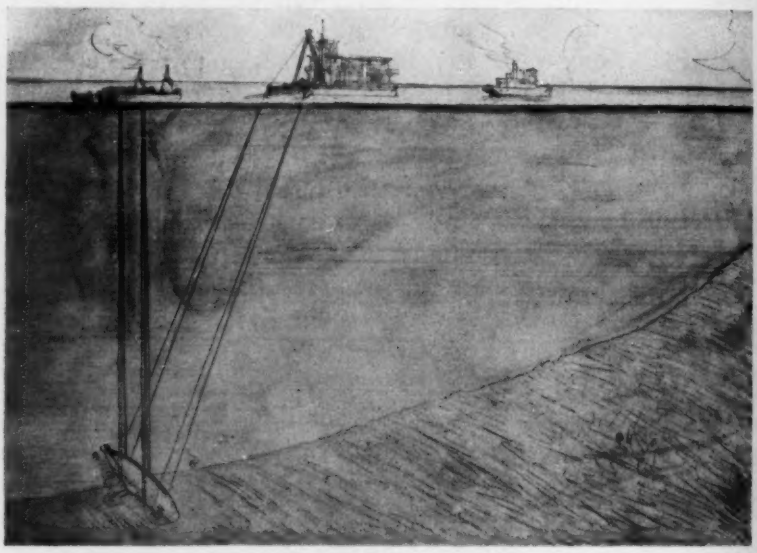

FIG. 7

the dredge to the bow and stern of the submarine were left in place, and kept taut by means of the drums. The towing in-shore was thus effected by a direct pull on the submarine, by way of the dredge, as shown in Fig. 7, instead of by way of the scows. The latter were secured to the dredge by manila lines. These lines were kept slack while lifting, so as to allow the scows to assume their normal position of equilibrium with reference to each other and the dredge. As water for the hoisting engines and light for working after dark were supplied from the dredge, the scows and the dredge had to be kept fairly close together. This was accomplished by heaving in on the bow and stern wires as the depth decreased.

Late in the afternoon of May 20, the first lift was made with the new slings. Work was continued until dark, the tugs in the meantime keeping a steady towing strain on the submarine by way of the dredge. A lift of 20 feet was made that day. This filled one of the windlass shafts with cable. Normally, one layer of turns on the windlasses represented a lift of 58 feet, but in the case of this shaft too many dead turns had been allowed. An effort was made to throw on a riding turn, when the shaft was full, so as to

FIG. 8

wind up a second layer, but the load on the sling proved to be too great. This hawser was cut next morning and the new ends shifted to the hook bolts. Lifting and towing were then continued as before.

By Monday afternoon, May 24, the *F-4* had been lifted and brought in-shore from a depth of 300 feet to a depth of 84 feet. It seemed certain that the vessel could be landed on the floating dock in Honolulu harbor the following day.

A program was laid out which called for shortening one of the chain slings that afternoon. This sling had been pieced out to 23

fathoms when one of the links broke on the first lift. Shortening the sling was necessary, before entering the shallow water in the channel, because chain could not be wound up on the windlass shaft.

It was planned, also, to shift, to a more favorable position, the after line, previously mentioned, because, as the distance between the bottom of the scows and the submarine decreased, this line began to bind on the mud pocket framing.

However, no part of the program could be carried out as planned. One difficulty after another was encountered in shortening the long sling. The only oxy-acetylene cutting torch available broke down, and had to be repaired. Then, when the chain had finally been adjusted to the right length, the sling jammed in replacing it. Instead of getting this part of the work done in a few hours, it was three o'clock the following morning before even a thought could be given to shifting the after sling. All hands then turned in for two hours, until daybreak at 5 o'clock.

As it was essential to send down a diver to examine and, probably, to work on the foul sling, it was considered advisable to still further reduce the depth. The vessel was accordingly lifted and towed to a depth of 50 feet. This position was reached at 8 o'clock, on the morning of May 25.

The divers were sent down promptly, to inspect the condition of the vessel and to report on the work necessary to shift the sling. They reported that the vessel was in good condition, with apparently no holes or badly damaged plating, and that the reason for the unsatisfactory lead of the after line was that it had cut a rent in the light superstructure plating which prevented it from slipping aft to the position desired. It was the divers' opinion that the chain would probably not clear easily. Also, a diver reported that the vessel was lying far over on her starboard side, with the conning tower partly in the sand.

In view of the manner in which the sling was foul, it was considered advisable to sweep a new wire hawser under the stern and to allow the chain to remain. This promised to be an easy job, as the stern was clear of the bottom, due to the strain which was still kept on the aftermost sling. Bad luck was again encountered, however, as the wire hawser fouled, probably due to the fact that it was somewhat kinked from previous use. By half-past

one in the afternoon the wire hawser had not yet been cleared and placed. Then without warning a heavy swell set in.

The scows began to surge back and forth with great momentum, due to the motion of translation which a large wave acquires in shallow water. Presently, the swell became worse, and large surf waves began to set in. It was now apparent that there was no chance of getting the fourth line on in time to carry out the contemplated program. As a forlorn hope, an effort was made to lift the submarine with three slings only. As was to be expected, the single after sling parted. Then, in order to save the submarine from further damage and to keep the scows from going on the reef, it became necessary to let go of the forward lines quickly, as heavy seas were beginning to break near the scows. Fortunately, the forward slings were cleared easily. This was accomplished by loosening up the in-shore hook-bolts of the windlasses and towing the scows seaward.

The heavy swell continued for two days. On the third day the divers were sent down to examine the vessel. They reported that the top of the submarine, in the wake of the forward chain slings, was caved in and torn almost half way through to the keel. This damage was caused by the surging of the forward scow.

On taking into consideration every phase of the situation, it was decided to change the plan of operations. In the first place, the months of June and July are the surf months, on the south side of the Island of Oahu. A heavy swell can, therefore, be counted on most of the time during these months, off the entrance to Honolulu harbor. It was considered likely that new lines could not be placed under the submarine and taken to the scows in the short intervals of smooth weather. This operation, from previous experience, was apt to take a number of days, hence there was danger of getting caught suddenly at any time as before.

The strongest reason, however, for changing the salvage plan was that the submarine might break in half while being taken through the channel, if lifted by the scows. This would have blocked the harbor to navigation. To have attempted repairs to the ruptured section, in order to permit using the former method of lifting, would have involved great expense and much delay, with no assurance of success. The work would have had to be done by divers and would have been made exceedingly difficult by the undertow.

There was no water shallower than about 40 feet in which the vessel could be landed. This was the governing factor in planning the new salvage method. The maximum draft which the floating dock in Honolulu can take is about 25 feet 6 inches. If there had been a gradual slope of hard bottom in other than the ship channel, from the resting place of the vessel to the dock, it might have been possible to use the customary pontoon method, whereby vessels are lifted 5 or 6 feet at a time and are towed to a new landing between lifts. This plan would have called for at least one landing directly in the channel. If trouble had been experienced in making the next lift promptly, the channel would have been blocked to navigation. In the harbor itself the bottom is soft, due to silting from streams and sewers. To have landed the vessel in mud would have been extremely hazardous, because mud suction practically doubles the weight to be lifted. Furthermore, the vessel would have filled completely with mud through the large aperture, as the canvas mats placed by the divers could not be counted on to keep the opening sealed.

The problem, therefore, resolved itself into one of lifting the vessel from a depth of 46 feet to a depth of not more than 25 feet at one step. In order to avoid breaking the vessel in half, it was necessary to support independently the portions of the hull forward and abaft of the ruptured section. To meet these requirements it was decided to sink a number of pontoon cylinders alongside of the vessel and to attach them to the submarine by means of chains. By unwatering the cylinders the vessel could then be brought to the requisite draft without an intermediate landing.

The plan adopted called for the use of six cylinders and six chains, with three of the cylinders on one side of the vessel and three on the other side. In order to leave a margin for breaking the boat away from the bottom, the lifting capacity of the six pontoons was made 420 tons. Not only did this margin provide the extra pull which might be needed to start the vessel, but it also took care of any failure to realize all the buoyancy available which would result should any of the cylinders become cockbilled to such an extent as to make it impossible to unwater them completely. It was assumed that the full lifting capacity of the cylinders could probably not be developed, due to the latter cause.

Four of the cylinders, the bow and the stern pairs, were made 32 feet long by 11 feet in diameter—the other two were of the

same length, but 12 feet 6 inches in diameter. Plates $\frac{3}{8}$ of an inch thick were used for the shell. The framing was arranged on the girder principle. A transverse water-tight bulkhead was fitted at mid-length dividing the cylinders into two compartments so as to facilitate sinking and blowing out. Without this bulkhead the cylinders would have been difficult to handle while being lowered into place, as there would have been no way of adjusting the trim. Two tons of concrete ballast were placed in the bottom of each so as to provide a certain amount of pendulum stability, otherwise they would have rolled freely like a log in the water. A 4-inch flood and discharge valve was fitted at the bottom of the end bulkhead of each compartment. Operating rods were provided for manipulating these valves from on top of the cylinders. A $\frac{3}{4}$-inch valve was fitted for each compartment, close to the middle bulkhead, for venting and for making the air hose attachment. These valves were located in this position so as to keep them clear of the lines and the chains. A completed cylinder is shown in Fig. 8.

The outside of the pontoons was sheathed with Douglas fir 4 inches thick, applied in widths of 3 inches. The use of narrow widths made it unnecessary to work the planks to the curvature of the cylinders. The sheathing was not attached directly to the plating, but was held in place by $\frac{1}{2}$-inch galvanized wire rope. The object of the sheathing was to prevent local damage to the plating in case the cylinders happened to land on anything sharp. The sheathing also served as chafing gear between the pontoons. The value of this feature was fully demonstrated in the actual salvage operations. In the case of all of the pontoons the wood on the side towards the submarine was so badly abraded that it is safe to say that the cylinders would have sprung leaks and possibly would have been punctured if this safeguard had not been applied. The object in not attaching the planking directly to the shell plating was to eliminate the danger of pulling out or loosening the bolts. A leaky bolt would have been as disastrous to the success of the undertaking as a puncture in the shell plating. The sheathing was fitted in four lengths—each section being held in place by three wire rope straps. The large cylinders weighed 73,000 pounds each and the small cylinders 63,000 pounds each, including the weight of the wood.

The valves in the end bulkheads were protected by heavy timbers, as will be noted from the cut. These timbers also served as fenders for the ends of the pontoons. The valve operating rods and end timbers were not placed vertically. This was necessary in order to clear the pads at the upper ends of the bulkheads. Three pads were fitted at each end. The side pads were intended for lashing across from one cylinder to its mate on the other side of the submarine. Such lashings were necessary only while the cylinders were resting on the bottom, in order to keep them snugly in position.

The attachment of the pontoons to the submarine was one of the most important features of the salvage arrangements. The method adopted was very simple and proved entirely satisfactory. As in the previous plan, it was impracticable to secure lifting gear to the submarine itself. Chains were therefore rove under the vessel and were then taken through hawse pipes fitted in the pontoons. This resulted in lifting the submarine in a cradle consisting of six chains.

A 12-inch hawse pipe was fitted 8 feet from each end of the pontoons. These hawse pipes consisted of steel castings connected by 12-inch steel pipe. The framing and longitudinal girders on the inside of the pontoons were riveted to webs forming part of the hawse pipe castings. Once the chains had been rove up through the hawse pipes, they were kept from slipping back when the load was applied, by means of heavy cast-steel clamps. The clamps were made in halves, moulded to the shape of the links. The two halves were drawn together and kept from spreading by four heavy bolts. The clamps were of such length that they bridged the hawse pipes and consequently transferred the load to the pontoons when buoyant. Fig. 9 shows a clamp attached to one of the chains. As 2-inch chain was used for the end pontoons and $2\frac{5}{8}$-inch chain for the middle pontoons, it was necessary to provide clamps of two sizes.

One of the essential requirements of the plan of operations was that the lifting chains and pontoons should be placed accurately in predetermined positions with regard to the submarine. This called for mooring the salvage craft which was used as the working base, to four buoys with control for shifting in any direction desired. Four wooden mooring buoys 10 feet 6 inches square

were built for this purpose. These buoys were anchored, as shown in Fig. 10, 45° off the port and starboard bow, and 45° off the stern of the submarine. Three navy type anchors weighing about 5000 pounds each and a 7000-pound anchor, which was picked up during the previous salvage operations, were used for the buoy anchorages.

The windward moorings were placed with particular care, because it was essential that the distance of the buoys from the

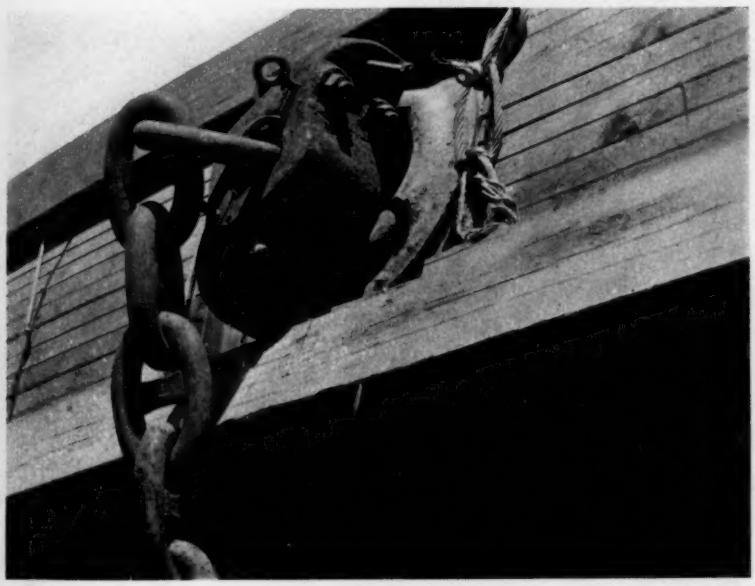

FIG. 9

salvage craft, when riding to a taut hawse, should be confined to rather close limits, otherwise the mooring lines would be of inconvenient length. With the salvage craft at mid-length of the submarine 200 feet was allowed for this distance.

The moorings were placed by the tug *Navajo*. In order to insure planting the windward buoys as desired, a marker was dropped to indicate the proposed location of the anchor. The anchor was hung over the side of the tug with the chain on board —the mooring buoy being towed alongside. For the stern mooring a ¾-inch wire line of measured length was made fast to the

rudder skeg of the submarine. When the tug had reached an approximate position on the line of bearing between the submarine and the marker buoy, the other end of the ¾-inch wire was made

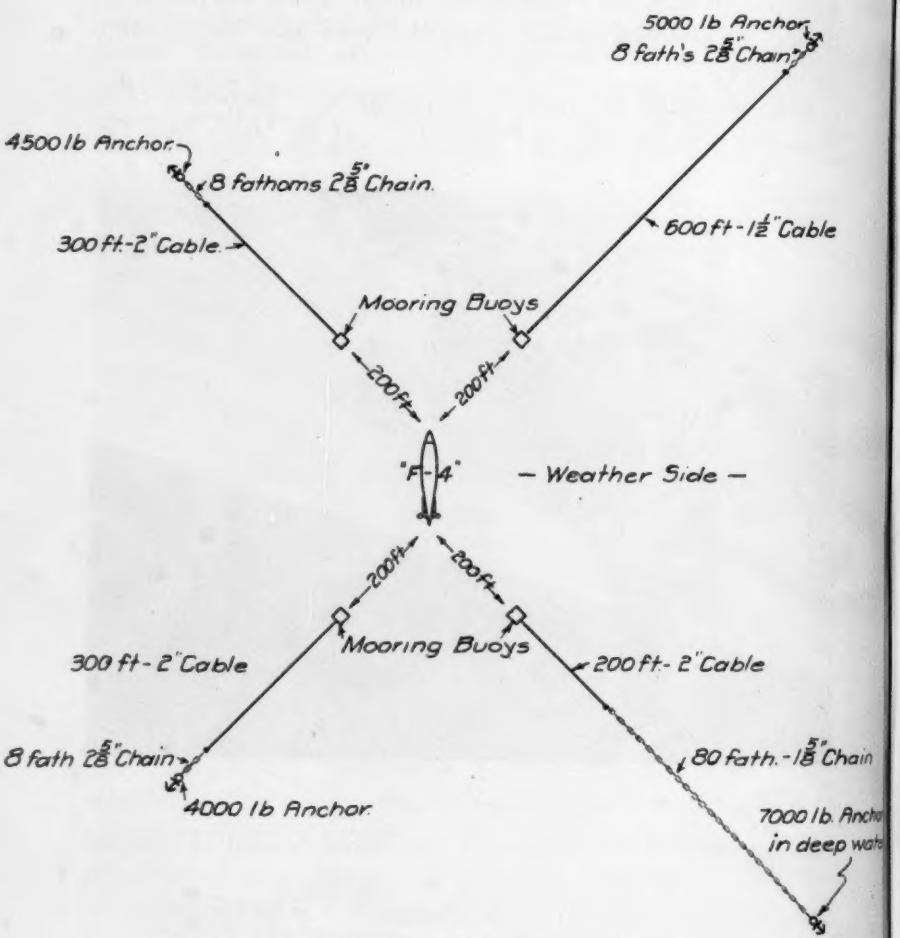

FIG. 10.—Arrangement of Mooring Buoys, Salvage of F-4

fast to the mooring buoy. The tug then went ahead in the direction of the marker buoy.

As soon as the distance line between the mooring buoy and the submarine was taut, the buoy was cast adrift and the anchor chain paid out. When all was taut and tending on the bearing desired,

the anchor was let go. This eliminated the liability of error in measuring the anchor chain and in the allowance to be made for the depth of water. The second mooring was placed in a similar manner. The other two moorings were planted by running them out from the salvage craft which had in the meantime been moored to the windward buoys.

The salvage craft consisted of a wrecking barge shown in Fig. 11, which had formerly been a dipper dredge. This barge was 98 feet long by 35 feet beam. It was equipped with a heavy *A* frame

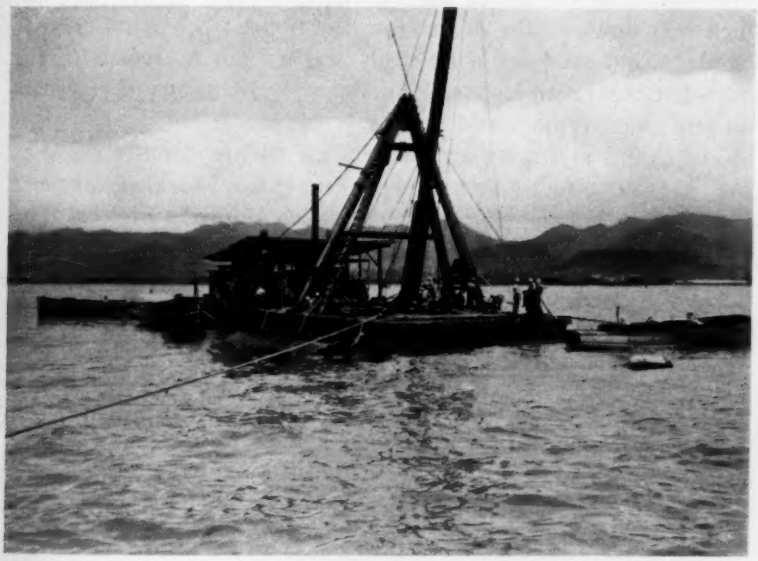

FIG. 11

and a substantial boom. The hoisting machinery on the barge consisted of two engines, each having two drums of $\frac{3}{4}$-inch plow steel wire rope. By taking the mooring lines to the niggerheads of the engines the barge could be shifted very conveniently. Special lead blocks and sheaves were rigged for handling the chains and for lowering the pontoons.

All of the lifting chains, clamps, etc., were placed on the deck of the barge before leaving the harbor. Two-inch chain was used for the end pontoons and $2\frac{5}{8}$-inch chain for the middle pair. As the depth of water was only 46 feet, 15-fathom shots answered the purpose, although this length did not bring the ends to the sur-

face. Frames Nos. *17, 27, 41, 51, 71* and *81* of the submarine were selected for the locations of the chains. It was hoped that a $2\frac{5}{8}$-inch chain which was still lying under the vessel at frame *27* from the previous operations could be used, but after spending several days attempting to clear it a new chain had to be placed. The divers tunneled under the vessel at frames *27* and *41* to make an opening for reeving the chains. In the other locations the vessel was sufficiently clear of the bottom to permit the chains to pass underneath without tunneling. In making the tunnels a hole was first started by the use of shovels and crowbars. A fire hose was then sent down to the diver from the tug *Navajo* lying close at hand. Coral sand could be easily washed out by means of the hose, but coral rock had to be broken away by means of crowbars on one side of the vessel.

The chains at frames *27* and *41* were rove under the vessel as follows: A 55-foot $\frac{3}{4}$-inch wire pendant *B* was shackled to runner *A*, one of the hoisting engine drum lines, as shown in Fig. 12. The end of the pendant was lowered to the bottom and passed through the tunnel by the diver. Runner *C* leading to the other drum of the engine was now lowered to the bottom on the opposite side of the submarine and shackled to pendant *B*. By paying out on runner *A* and taking in on runner *C* the end of pendant *B* was brought to the deck of the wrecking barge where it was shackled to end *D* of the 15-fathom shot of chain. Runner *C* was then shackled into end *E* of the chain. By hoisting away on runner *C* part of the weight of the chain was taken off the deck. The other end of the chain, shackled to pendant *B*, was then worked overboard—the chain being kept under control by a rope stopper taken to the timber head at the corner of the barge. By hauling away on runner *A* the end *D* of the chain was brought into the tunnel. The length of the pendant was such that when the lower end of the chain had been brought to the mouth of the tunnel the shackle at the upper end of *B* came well above the water's edge. In the meantime the tug *Navajo* had been anchored at right-angles to the barge opposite the tunnel, with her stern about 30 feet from the barge. The wire towing hawser from the tug was now brought to the barge and shackled to the upper end of pendant *B*—runner *A* being unshackled at the same time. By going ahead on the tug the chain was pulled through the tunnel. The *Navajo* kept her position relative to the submarine by heaving in on her

anchor. As the chain rendered through, runner *C* was paid out. The amount that the chain had been hauled through the tunnel was ascertained by marks on *C*. After the chain had been rendered so as to leave it about even on both sides of the submarine, the *Navajo* stopped and paid out her tow line. The divers then unshackled the lower end of pendant *B*. The insertion of pendant *B* simplified the work of the divers, as this pendant was easy to

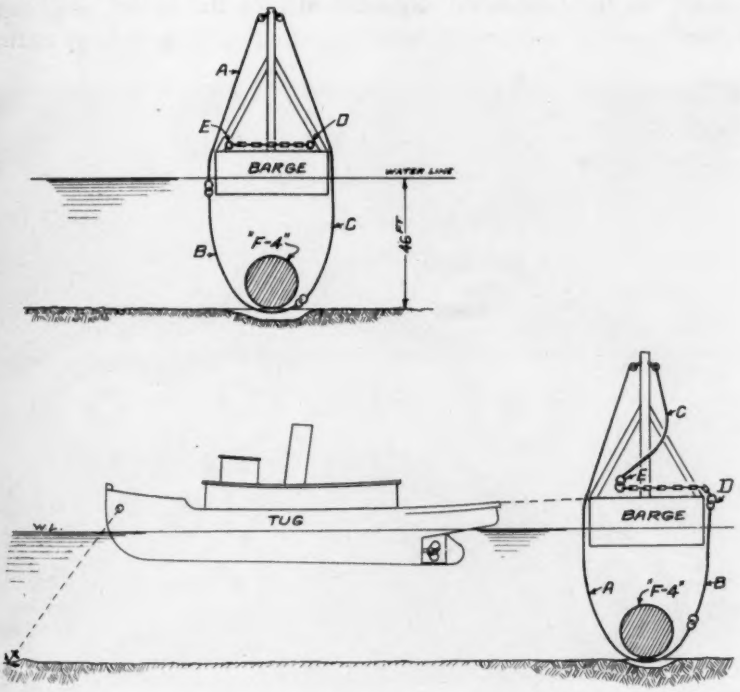

FIG. 12.—Method of Reeving Chains under the Submarine

handle, whereas the *Navajo's* heavy wire hawser would have been very difficult to work through the tunnel.

In order to lay the other end of the chain clear of the submarine, a motor boat passed a 3-inch manila line around runner *C* and towed off at right angles to the barge—the runner being slacked off with the strain. The chain having been stretched out sufficiently, the divers unshackled runner *C*.

Considerable difficulty was experienced in reeving the chain under the vessel at frame *27*, because of the ragged condition of

the superstructure and of the muffler pipes in this vicinity. No difficulty was experienced in towing the chain through the tunnel at frame *41*. The chain at frame *51* was also towed through, but a tunnel did not have to be dug.

In the wake of frames *17*, *71*, and *81* the vessel did not touch the bottom, which made it possible to place the chains without the aid of the tug. The procedure consisted of dropping runners *A* and *C* to the bottom on opposite sides of the vessel, shackling them together underneath, and then bringing both ends up to the

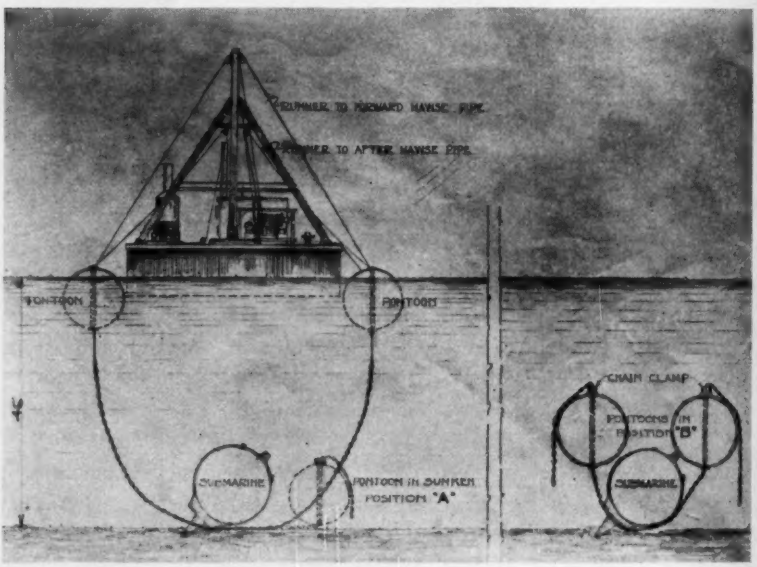

FIG. 13

deck of the barge by winding up one and paying out the other. The runners were now shackled into the respective ends of the chain. By easing away one runner and taking in on the other, the chains were rendered into place. The motor boats then stretched out the ends in the manner described above.

In order that the slings might be placed exactly in the desired fore-and-aft position, it was, of course, necessary to shift the barge after each operation. This was accomplished by taking the mooring lines to the niggerheads of the engines. A diver was sent down as soon as the barge was assumed to be in the right position and a runner had been dropped as a marker. At certain

times of the day the vessel could be seen with absolute clearness from the surface by the aid of waterglasses, but, on account of the refraction and because of the perspective in looking down at this depth, observations from above could not be trusted without confirmation from the divers.

After all the chains had been laid out on the bottom under the vessel, the barge was shifted for landing the midship pontoons.

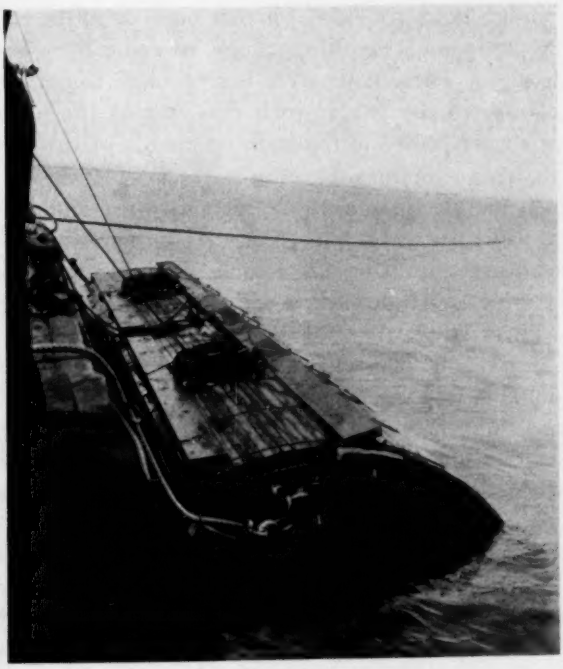

FIG. 14

These were flooded to about 3 feet of freeboard in the harbor before being towed out to the job. One pontoon was placed on each side of the barge opposite the *A* frame, as shown in Fig. 13. The four runners from the engine drums were dropped through the hawse pipes to the bottom and a report made by the divers on their location with reference to the chains. When the position was reported as satisfactory, the runners were shackled to the ends of the chains. In the meantime flooding the pontoons was continued.

A 50-foot length of pneumatic hose, fitted with a ¾-inch valve at the end, was connected to each vent. By manipulating these valves, the trim of the pontoons was kept under control. The flooding valves were left open. As soon as the runners had been dropped through the hawse pipes and shackled on below, the clamps were placed on top of the castings, as shown in Fig. 14. In order to facilitate the work of the divers in bringing the two halves of the clamps together, loosely-fitting ¾-inch guide bolts were passed through holes provided for that purpose in the ends of the billing the pontoon. The object of the lowering lines was to pre-clamp castings. These bolts were long enough to permit spreading the clamps to the full 12-inch diameter of the hawse pipes. The clamps were lashed to the running boards of the pontoons to keep them from slipping off.

Five-inch manila lines were made fast to the end pads of the cylinders. The forward line of each pontoon was taken to a timber head and the after line to the niggerhead of one of the hoisting engines. These lines were marked every five feet as a guide for lowering the two ends uniformly.

When everything was in readiness, the final flooding of one of the pontoons was started. As soon as the pontoons showed a tendency to sink, the vents were shut off to avoid further increase in negative buoyancy. Any slight excess of water in one compartment had the effect of making that end go down first and cock-vent the cylinders from sinking end on as would invariably have happened without such control. As soon as the divers reported that a cylinder was lying squarely on the bottom, parallel and close to the submarine, the vents were opened for complete flooding. In the case of one pontoon one end had to be lifted and swung in closer to the vessel. This would have been difficult had the pontoon been completely filled with water before the adjustment was attempted. The flooding valves were closed after the pontoons had filled completely, in order to prevent the entrance of sand.

Although the negative buoyancy was kept well in hand by careful venting, the cylinders, nevertheless, showed a decided tendency to become unmanageable and heavy as soon as the water plane area had vanished. All of the pontoons were, however, lowered without mishap and without parting lines.

The divers began bolting on the clamps as soon as the position of a cylinder was reported as satisfactory. It was not essen-

tial that the clamps for the first lowered pontoon of a pair should be fitted to any particular link, but once fitted it was necessary to know exactly the link on which each was placed so that the clamps on the opposite side might be placed correctly. This in order to insure that the proposed amount of slack was left in each chain. If the chains had been hauled up snugly and the clamps had been placed directly above the hawse pipes, the pontoons would have been held down alongside of the submarine on becoming buoyant. This would have brought a considerable crushing stress on the sides and would have been particularly objectionable, because of the excessive stress to which the chains would have been subjected.

The work of bolting on the clamps was extremely arduous, as the castings were necessarily very heavy. The principal handicap under which the divers had to labor was the constant pumping of the chains as there was, of course, always some swell running. The chains had to be kept suspended from the barge runners, otherwise the difficulty of fitting the clamps would have been even greater.

The clamps were attached to the port forward chains with that pontoon afloat so as to eliminate as much under-water work as possible. Once attached this pontoon was hove down with a small amount of positive buoyancy by hauling away on the chains on the opposite side. This procedure was, however, somewhat hazardous, because of the possibility of a chain fouling under the vessel and failing to render. The procedure could be adopted with safety only in the case of the forward pontoons, because the submarine was not elsewhere sufficiently clear of the bottom in the wake of the chains.

The best method of unwatering the pontoons was given considerable study. Pumping was ruled out as involving the installation of under-water machinery. The use of pumps operating on the surface was not feasible, because the suction lift was too great. Displacing the water by air was, therefore, the only alternative.

It was highly important that once the unwatering of the cylinders was started it should be completed in the shortest possible time and with the minimum risk of breakdown—this because of the rapidity with which the swell builds up outside of Honolulu harbor. It would have been fatal to the salvage operations if, when the cylinders were partly unwatered, hence floating, but with

insufficient buoyancy as yet to lift the submarine, heavy swells and the resulting undertow had taken charge. Under these circumstances there would probably have been insufficient time to either reflood the cylinders with a view to again sinking them, or, to complete the unwatering process. The effect on the submarine and on the salvage operation in general, if this contingency had arisen, would have been similar to the previous experience when the vessel was being lifted by means of scows. Therefore, in

FIG. 15

planning this feature of the work a maximum time of two hours was set for the unwatering process.

There were available two methods of providing the air for displacing the water—the direct use of air compressors or the use of charged air flasks. The former method would have involved the installation of a number of special air compressors on the tug *Navajo*. There would have been considerable difficulty in finding suitable space on the *Navajo* for the installation of these compressors, receivers, manifold, etc. Also, the liability of air compressors to breakdowns had to be borne in mind. It was, therefore, decided to take the air from charged torpedo flasks.

Calculations indicated that 24 torpedo air flasks blown down from 2150 pounds to 200 pounds pressure would furnish enough air to raise the vessel. In order to maintain a rapid flow of air from the flasks it was proposed to blow down to only 200 pounds. Tests were made which demonstrated that a flask could be blown down safely from 2150 to 200 pounds pressure in about five minutes against a receiver pressure of 50 pounds. On the basis that the air would have to be delivered to the pontoons by twelve 150-

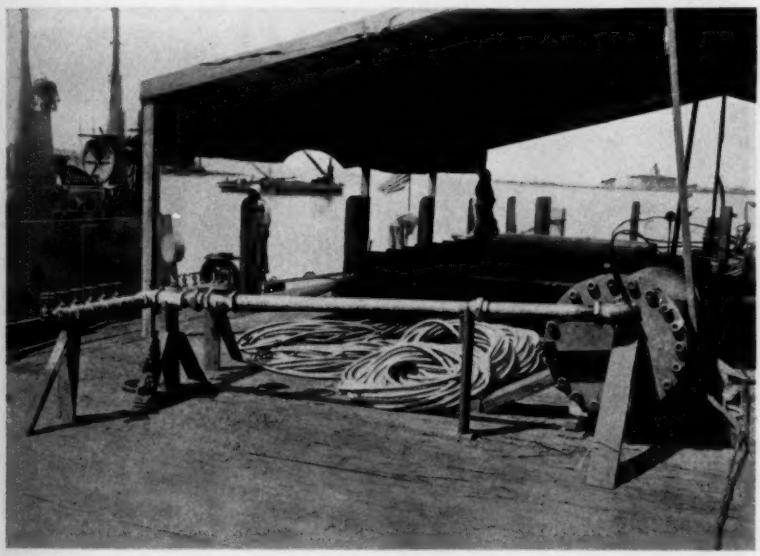

FIG. 16

foot lengths of $\frac{3}{4}$-inch hose against a water head of 46 feet and with a differential pressure of 20 pounds, it was calculated that the cylinders could be unwatered in about 100 minutes. When this stage of the work was actually reached, the differential pressure was kept somewhat below 20 pounds as a precaution against starting the seams of the end bulkheads of the pontoons. The cylinders were actually unwatered in about two hours after air was fully turned on.

Twenty torpedo air flasks were installed on a coal barge, as shown in Figs. 15 to 17. These flasks were connected in parallel to a 7-inch extra-heavy pipe. This pipe discharged into an expan-

sion chamber made from a piece of cast-iron pipe 22 inches in diameter by 8 feet long. These features are shown in Fig. 15. The expansion chamber was piped to a 12-valve manifold to which the pneumatic hose lines leading to the pontoons were attached, as shown in Figs. 16 and 17. A gauge was installed on the 7-inch pipe as well as on the valve manifold.

The 7-inch extra-heavy pipe was necessary so that if anyone of the valves from the flasks should happen to blow through, the full pressure would not be thrown on the large expansion chamber and

FIG. 17

on the hose leads. This arrangement also made it possible to throw in a new flask by simply opening a valve. The pressure at the hose manifold was kept at 35 pounds until the cylinders emerged. By throttling the flask valve and the valve in the line to the expansion chamber, this pressure was maintained without difficulty.

The number of flasks available for blowing out did not leave much margin for losses due to leaks or due to carrying away hose lines. It was decided not to incur the risk of delays from these causes. One of the submarines was, therefore, moored with her bow close to the barge. A high-pressure copper air-line was

connected direct from the submarine's air banks to the 7-inch pipe. The air obtainable from the banks was sufficient to displace about half the water which had to be removed. On account of the large friction loss in the small copper pipe, the desired rate of flow could not be maintained after the bank pressure had fallen to about 850 pounds.

As soon as the last pair of cylinders had been landed alongside of the submarine, the coal lighter, with its equipment of air flasks, was substituted for the wrecking barge. The lighter was moored

FIG. 18

about 50 feet to windward of the submarine so that there would be no interference when the pontoons emerged.

On Sunday, August 29, everything was in readiness for bringing up the *F-4*. The vessel had now been on the bottom for five months. Connecting the hose leads to the pontoons and opening the discharge and blow valves was left until that morning, as it would have been inadvisable to subject the twelve 150-foot lengths of hose to the action of the swell during the night. When all connections had been made, a diver was sent down to watch the pontoons and to report by telephone as they became buoyant. The air was then started on all four compartments of the

stern pontoons. When this pair was buoyant, the air was shut off and the middle pontoons partly unwatered in the same manner. When the bow pontoons were reached, it was necessary to bring the forward end of the seaward cylinder off the bottom in advance of the after end, in order to clear the bow rudder on this side, which was still in place and projected upward at an angle of about 45°. If this had not been done, the pontoon would have jammed against the sharp point of the rudder which would probably have resulted in serious damage to the cylinder.

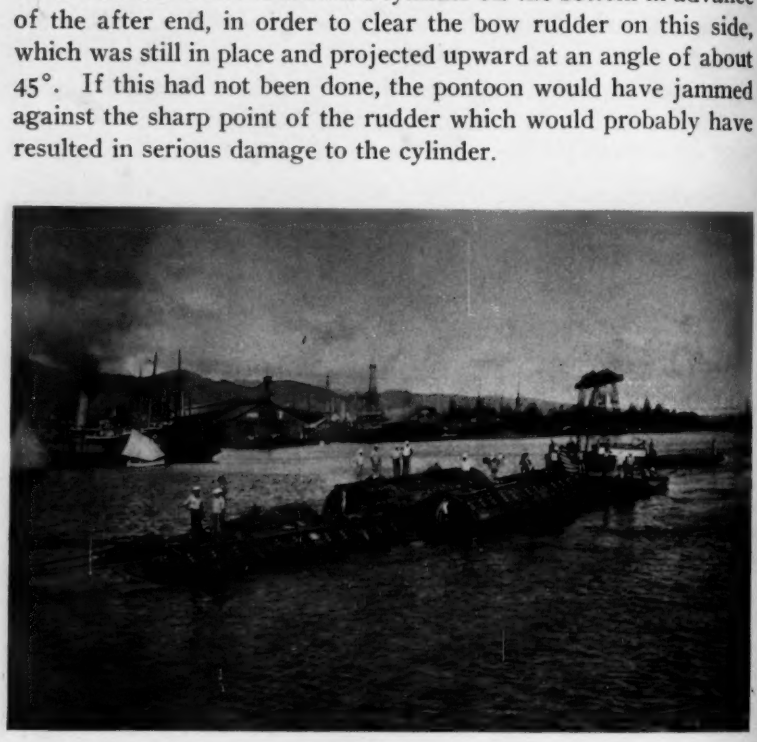

FIG. 19

After all of the pontoons had been brought to a reasonably horizontal position by manipulating the manifold valves, air was turned on to all 12 compartments. One end of the submarine came up slightly ahead of the other, as was to be expected. In Fig. 18, the bow pontoons are shown just emerging. It will be noted that they are still considerably cockbilled. This was due to the fact that the chains were not attached to the submarine, but were simply rove under the vessel, from the pontoon on one side to its mate on the other side. One end of each pontoon was bound to become buoyant slightly ahead of the other, no matter how far the subdivision into compartments might have been carried. The buoy-

ant end then pulled the slack chain through under the vessel. The natural result was that the pontoon on the other side cockbilled in the opposite direction. As long as there was a sufficient margin of buoyancy in all six pontoons, the cockbilling made no difference, as enough water could be blown out of the high ends to provide the lift needed. The low ends could, of course, be completely unwatered. Once the pontoons emerged, they immediately adjusted themselves automatically as the high ends ceased to be water borne and therefore exerted no pull on the chain. This permitted the buoyancy of the low end of the opposite pontoon to assert itself, thus causing the chains to render. Fig. 19 shows the pontoons on the surface, being towed into the harbor. It will be noted that all of the pontoons are now in practically a horizontal position.

The question suggests itself why the pontoon method which was finally adopted could not have been used originally for bringing the vessel to the surface. This would have been impracticable, because of the great depth of water in which the submarine lay at first. Whereas sinking the pontoons alongside of the vessel and fitting the chains was not particularly difficult in 46 feet of water, the task would have been quite impossible at a depth of 300 feet. The divers from the submarine flotilla had to work from five to nine hours a day from August 21 to August 29, while placing the chains under the vessel, securing the clamps after the pontoons had been landed, closing flood and vent valves, and, later on, connecting the hose leads for blowing out. This work could not have been done at a depth of 300 feet, as most of it was extremely arduous and fatiguing.

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

BATTLE TACTICS[1]

By LIEUTENANT R. A. DAWES, U. S. Navy

GENERAL

Tactics is defined in the U. S. Naval Instructions, 1913, as follows:

"Tactics applies to all naval movements and operations made after contact with the enemy's forces. The term 'contact' being employed in a broad sense, meaning such proximity to the enemy as affects fleet formation and renders a battle imminent." Writers on tactics and the art of war have defined tactics in various ways. Clausewitz called it the use of troops in battle; and Jomini, the art of fighting on the field of battle; while Von Moltke said that tactics was the method of using the different arms in fighting, telling how one ought to fight. General Bonnal, a French writer, considers tactics as the science of executing.

The various movements and evolutions made by the ships of a fleet at drill are often called tactics. This seems to be a very narrow definition, since it does not include the relations which the different types of ships making up the fleet should bear to each other. During the wars of the sailing ship period, after the fire-ships had been relegated to the scrap-heap, these movements and evolutions were practically the whole of tactics. In the war of the future the tactics of battle will be composed of more than the simple evolutions of the fleet of battleships. The commander-in-chief, in the next war, will have to handle, besides the main battle-fleet, the flotillas of destroyers and submarines, the fast wing, and possibly aeroplanes. And the successful leader will be he who knows the part which each of these types of ships must

[1] This article was written in 1914, before any of the naval actions of the present war.

play; he who knows their limitations, their strength and weakness; and who can handle them in battle so as to get the best out of them. "The tactics of battle," says Daveluy, "are composed only of incomplete and scattered elements. They exist only for that day when the maneuver will have an exact meaning and will make answer to a well-defined aim on the part of the enemy."

Weapons govern tactics and modify methods, but, from the days of the Armada to those of Tsushima, the gun has proved itself to be the only weapon by which decisive victories can be won. There is no reason to suppose that this condition will be changed in the near future. We may, therefore, safely lay down as a law of naval warfare that tactics must now, as always, be directed toward bringing the greatest number of effective guns to bear upon the enemy at effective ranges in the shortest time.

The object of tactics is the same now that it was in the days of Nelson—the destruction of the enemy's fleet and the winning of the command of the sea. Men and methods change, but the object remains the same, and that nation which enters upon a war without that object must give up all hope of ultimate success. History gives too many examples of the influence of sea-power upon the results of a war for this point to need any argument.

The tactics of battle should possess both speed and simplicity. They demand simplicity because there will be no time for any complicated or intricate evolution. Furthermore, there will be too much going on close at hand for captains, or division commanders, to give the proper amount of attention to any extensive maneuvers. Speed is required in order that the movement may be completed in the shortest possible time; that the enemy may not see the object aimed at too soon, or reap any benefit from his movement to which our movement may be an answer. Also, that the volume of fire may be decreased as little as possible. Both conditions must be fulfilled in order that the fire-control may be affected as little as possible.

The factors which go to make up battle tactics are morale, initiative, coordination, mobility, and fire-power.

Morale includes the state of discipline on board ship, the degree of training to which the men have attained, and the spirit which actuates them. Confidence in their own powers and in their officers is, by far, the greater part of morale. Professor Bakewell, in a lecture before the Naval War College, said, "It needs no

argument to prove that victories are won, not by greater numbers or by possession of superior engines of war, but rather by the character and training of the men. It requires no argument to prove that the desired military virtues tend to spread from officers to men by a sort of contagion, whenever the commander, having already acquired respect for his wisdom and practical knowledge of warfare, vividly embodies in his own person the spirit of resolute bearing, self-confidence, and the determination to win. Doubts dissolve and obstacles vanish when he appears, and the impossible happens. These things we may take for granted. Every great general bears witness to their truth; every war has written the demonstration in letters of blood."

A study of the life of Nelson will show how true is that quotation. Time and again we see him exhibiting all the virtues which Professor Bakewell ascribes to the commander, and just as often we see him leading his fleet to victory against almost overwhelming numbers. Truly a good example for all to follow.

Initiative—the ability and willingness to act upon one's own responsibility, to do what the occasion demands without waiting for orders—is another factor of the utmost importance in battle tactics. There are two kinds of initiative—trained and untrained. Untrained initiative is worse than none at all for the exercise of this type of initiative may, and in most cases would, cause untold disaster. The subordinate commanders must be trained in the exercise of their initiative, just as the gun crews are trained in the handling of the gun. History furnishes an excellent example of trained initiative in the action of Nelson at the battle of St. Vincent, where, without orders, he left the line and prevented the two detachments of the Spanish fleet from uniting.

In order that subordinate commanders may exercise their initiative intelligently they must be informed of, and thoroughly conversant with, the plans of the commander. They must understand the object for which the commander is striving, and know exactly the part which they are to play in attaining that object. After learning the ideas and plans of the commander, they should be left free to carry out their part of the plan in their own manner. Success can hardly be hoped for when initiative is killed by too explicit orders, or is discouraged by those in authority. On the other hand, we must never be afraid of ordering plainly and dis-

tinctly all that which is really necessary. But no subordinate commander must be left in the dark as to what is to be done.

Lack of initiative was responsible for many defeats in the Boer war; while one of the best examples of the result of lack of initiative occurred during the Russo-Japanese War, at the battle of Liao-Yang. A Russian commander, hard pressed, and out-numbered by the Japanese, sent a request to the officer in command of a cavalry regiment stationed nearby for assistance. The request was refused on the ground that the cavalry commander had no orders to send any men to help him. Yet that body of cavalry took no part whatever in the battle.

The next factor is coordination—the power of acting together, or the power of combination. The various units composing the battle line must be drilled and trained until they work together like the parts of a machine. The officers and men must have worked with each other until every individual of a fleet knows to what extent he can rely upon the other members of the organization. Each must forget himself in striving for the success of the fleet as a whole, just as the various members of a football team are required to work for the good of the team.

The other two factors—mobility and fire-power—are so self-evident that nothing need be said concerning them. Mobility, however, includes flexibility. Our battle tactics must not be rigid. We must not allow ourselves to be bound down by any hard and fast rules, regulations, or ideas as was the case when naval men first took up the study of tactics. Until Nelson proved conclusively that tactical rules could, and should, be broken at times, naval officers were tied hand and foot by rules which they broke only at their peril.

This was particularly true of the French, who were so obsessed with the ideas of certain formations that any commander who violated the regulations concerning them was punished with death. Villeneuve, hampered by the tactical rules of his day, was unable to do anything to free himself from the position in which he found himself at Trafalgar. He was considered the best tactician of his day in the French Navy, yet, when he saw his predicament he could only cry out, " Je n'ai ni moyen ni les temps d'adopter une autre tactique avec les commandants auxquels sont confiés les vaisseaux des deux marines."

There are two kinds of tactics—offensive and defensive. Much has been written concerning these two forms of tactics; but military writers are almost unanimous concerning the superiority of the offensive. Clausewitz, alone, seems to be an advocate of the defensive. There is much to be said about each kind of tactics and, theoretically, the defensive is the stronger; yet history teaches us that it is the offensive which is nearly always victorious.

The best examples of the results of offensive and defensive tactics are found in the history of the wars between the French and the English. The French, nearly always assuming the defensive, awaited the attacks of the English with the resignation of martyrs, and merely accepted the battle which the English forced upon them. The shining exception to this general rule is found in the campaign of Suffren, in India. Decisive victories cannot be won by the defensive. As a writer in the *London Times* recently remarked, "Victories must still be won by the offensive—tactical and strategical—and defensive ideals are futile and dangerous." Improvements in armor and the development of shell-power have in no way affected the truth so firmly grasped by Nelson and so forcibly stated by Farragut, "The best protection against an enemy's fire, is a well-directed fire from our own guns."

"Fortunate the soldier," says Von der Goltz, "to whom destiny assigns the rôle of assailant. To make war is to attack." All the advantages are with the offensive. Knowing where he intends to strike, the commander is not beset with a thousand doubts and worries as to where the blow will fall. The rôle of the assailant increases the morale of the attacking forces, and lowers that of the attacked. In this connection, Montesquieu once said, "The nature of defensive warfare is discouraging, it gives to the enemy the advantage of the courage and energy of attack: It would be better to risk something by an offensive war than to depress minds by keeping them in suspense."

And history bears out the truth of that statement most emphatically. The French, almost always on the defensive, followed a policy of "no risk," endeavoring to save their ships in the hope of achieving some ulterior object. Little did they realize that the defeat of the enemy's fleet would make certain the accomplishment of their strategic plans. Neither can the offensive be undertaken with a policy of "no risks." The commander must throw his entire force into the battle and stake everything on the issue. He cannot

win victories who is afraid of spilling blood, or who is afraid of losing ships. "In war," said Napoleon, "men are nothing, but a man is everything."

HISTORICAL

The history of naval tactics does not show so many changes as are found in the tactics of war on land. Up to the end of the seventeenth century the main object of each captain was to put his ship alongside one of his adversaries and to take him by boarding. Since that time, whenever two fleets have met, the fighting has been at longer ranges, as a general thing. And, with the advent of high-powered guns and armored vessels, the range has continued to increase until it has reached the long range of the present day.

The tactics of the galley period were more exact than those of the early days of the sailing-ship. With practically only one weapon of offense, the galleys were restricted to certain formations in order to obtain the greatest advantage from that weapon. To use the ram to the best advantage, the galleys were obliged to maneuver in line. This formation allowed each ship to use its ram with the greatest of freedom and also provided mutual protection for the weak sides of the galleys. Being propelled by oars, the galleys, like the steam vessel of to-day, were able to take any course they wished and were not restricted in their choice like the sailing ship.

The theory of the ram has followed down almost to the present day. It is only a few years since the great powers began building ships without rams. With but one isolated example upon which to found their theory (the battle of Lissa), many tacticians hailed the ram as the main weapon of offense in battle. Since then the ram has disappeared, as it was bound to do as soon as scientific thought was put upon it.

Following the ram and the galley tactics came the early sailing ships. With no effort to keep any formation, fleet actions were merely large melees in which each captain endeavored to take his adversary by boarding.

Toward the end of this period, noted for its lack of tactics, the fire-ship made its first appearance. This little vessel, the forerunner of the torpedo craft of a later day, first became a part of the battle fleets in 1636. Manned by a small crew, it was its duty to drift down into the fight and, if possible, to get alongside one of

the enemy's vessels and to set it on fire. In this it were often times an equal menace to both friend and foe; for changing winds and uncertain currents made it anything but certain in its attack.

Later on, in 1704, it is found in the plan of the battle of Malaga in the position advocated by Paul Hoste—in the second line, half a league on the unengaged side. Owing to its lack of speed and the complication of tactics, it soon disappeared from the fleets of that day.

Tactics, or the use of some formation in battle and the adhering to it, are first found in the battle of the Texel in 1673. Here the column formation was used for the first time and efforts were made to bring all ships into action at the same time. This was often prevented when the fleet bore down in line of bearing upon the enemy. In most cases the line was broken soon after opening fire.

Since that time the formation of the fleet in battle has been more and more strictly adhered to by naval tacticians. As has already been said, tacticians became so obsessed with importance of battle formation that he who left the formation was punished with death.

With the introduction of steam it became easier to maintain formation and so avoid the confusion found in the tactics of the sailing-ship. The introduction of the long range gun has made the keeping of formation more of a necessity than ever before, in order that ships may obtain the maximum fire-power.

DISCUSSION

1. *Formations and Evolutions.*—In taking up this subject it must not be supposed that it is possible to find some one formation or evolution which will, of itself, give victory. While there are many examples in history of victories being won because of some maneuver, there are none to lead us to believe that there is any particular formation which will prove the "open seaame" to victory. No absolute rule can be laid down as to what formation must be used to insure success. Many theorists have contended that the line of bearing used by the Austrians at the battle of Lissa was the cause of their victory; yet, at the battle of Yalu, the Chinese, whose fleet was in double line of bearing, were defeated. In the first case the vanquished were in column; while in the second, it was the victor whose ships were in column.

At Trafalgar, Nelson took his fleet into action in a double column—a line of squadrons—and won a most decisive victory over the French who were in single column and "capping" the Englist fleet. A similar situation is found at Tsushima; yet in this case, it is the line of squadrons which is defeated and the single column which is victorious.

From these examples it is plainly evident that we must look elsewhere for the causes of victory. These we find in the energetic attack of the victors, the morale of the attacking fleets, and the advantages given the victor by the inefficiency and lack of training in the defeated fleets. As it was with Nelson, Suffren, Tegethoff, and Togo, so will it be in the future, that victory will rest with the side that understands and takes advantage of all the factors that work for the end in view—the destruction of the enemy's fleet and the command of the sea.

The four victories of Trafalgar, Lissa, Yalu and Tsushima are very much alike in that we find, on the one side, energy, determination, discipline, excellent morale, and initiative; while the defeated side is noted for its lack of all these qualities. In discussing this subject Darrieus says, "This observation (speaking of the battle of Lissa) strengthens the impression already received from the study of history, that it would be vain to seek for the formula of some one formation applicable to all cases and sure to give victory."

Then what formation shall we adopt when going into battle? Evidently there are certain conditions which must be fulfilled, the first and greatest of which is fire-power. No sane commander-in-chief would lead his fleet into battle in such a way as to lose any of his fire-power. It is certainly clear that the formation which allows the maximum fire-power is the column, or a line of bearing approaching the column. The column answers to another one of our requirements in that it is simple. But can we say that it fulfills the third condition—that of flexibility?

Under one condition, and only one, will the column be flexible enough to answer to our requirements. When the subordinate commanders are fully acquainted, in every detail, with the plan of the commander-in-chief; are fully indoctrinated with his tactical ideas; are working in thorough harmony with him; and are allowed to exercise their initiative in carrying out their parts of the battle plan; then, and then only will the column be flexible enough to fulfill all

conditions. It is out of the question for any commander-in-chief, at the head of a column of sixteen ships or more, to be fully acquainted with all that may be taking place at the tail of the column. Powder gases, the splashes of the enemy's shells, and the interference of ships will all combine to prevent his seeing all that is going on in the rear divisions. The commander of the rear division, on the other hand, knowing all the conditions in his division; knowing the plan of battle; should be so trained and thoroughly imbued with the ideas of the commander-in-chief that he can be trusted to do the right thing at the right time, without waiting for orders from the flagship. These were the conditions under which the column won at Tsushima.

The question of the column as a battle formation has already been most ably discussed in the PROCEEDINGS by Lieut. Commander Knox, so it will not be necessary to go again into all the faults and weaknesses of the "follow the leader" plan of battle. That some semblance of column is necessary in order to derive full benefit from previous gunnery training is almost axiomatic; but to tie all the ships to a single column is to bind the hands of the division and squadron commanders. The so-called group column, with the group commanders properly trained in the exercise of their initiative, gives much more flexibility than the long single column and does not reduce the fire-power of the fleet.

The group column has been advocated before, and just recently Bernotti has brought it up again. Besides adding to the flexibility of the battle formation, it relieves, to a certain extent, the group commanders from the necessity of blindly following in the wake of the commander-in-chief. It leaves to each subordinate commander the responsibility of handling his group in all of the ever-varying situations arising in battle in accordance with battle tactics and the plans of the commander-in-chief.

That the value of group control and the intelligent use of initiative by the group and ship commanders was fully appreciated by Nelson is seen by studying his battles, particularly the Nile and Trafalgar. It is shown most conclusively in his famous Memorandum—"The second in command will, after my intentions are made known to him, have the entire direction of his line to make the attack upon the enemy, and to follow up the blow until they are captured or destroyed." That sentence expresses, in a nutshell, the entire theory of the group formation—to leave to each group

commander the entire conduct of his group in general accordance with the previously expressed plans of the commander-in-chief.

Another point which comes up under this subject of formations is that concerning the order of the fleet for steaming. What this formation should be is so self-evident that only a word need be said about it. No one will deny that, at the time mentioned in our definition of tactics-contact with the enemy, it should be the order of fighting. Failure to realize this basic principle was largely the cause of the Russian defeat at Tsushima, where they were caught in a formation which bore no resemblance whatever to a battle formation. And yet, this principle was most clearly enunciated by Nelson when he said, in his Memorandum, "Thinking it almost impossible to bring a fleet of forty sail of the line into a line of battle in variable winds, thick weather, and other circumstances which must occur, without such a loss of time that the opportunity would probably be lost of bringing the enemy to battle in such a manner as to make the business decisive, I have, therefore, made up my mind to keep the fleet in that position of sailing (with the exception of the first and second in command) that the order of sailing is to be the order of battle. . . . ."

To sum up then, the fleet should steam in the order of battle, or at least, in such order that battle order may be quickly assumed upon contact with the enemy. From the moment of contact the group commanders should exercise full control over their respective groups, handling them in such manner as the conditions encountered, and the plans of the commander-in-chief, will permit.

Coming now to the evolutions to be performed upon the field of battle we can only say that they must be those most suited to the conditions at that time. Each group commander must perform those evolutions which will tend to the accomplishment of the end in view. Conditions, like weapons, govern tactics, and no one can predict what his adversary's next move will be. These conditions include the state of the sea and weather; the discipline and morale of both fleets; and the condition of material in both fleets. A movement condemned by theory as reckless and foolhardy, may be used with impunity against an enemy whose fleet is in a state of moral and material demoralization. The maneuver of Nelson, at Trafalgar, was one which could hardly have been used against an enemy as well trained and as well commanded as the English.

The evolutions performed in battle should, besides working for the success of the plans of the commander-in-chief, tend, wherever possible, toward the fulfillment of the greatest principle of tactics —concentration upon some portion of the enemy's line. It is highly probable that the plans of the leader will contemplate concentration and be based upon securing it sometime during the action. This principle is as old as naval warfare itself, and was practiced by Nelson in nearly all of his battles, particularly Aboukir Bay and Trafalgar. It was used by Tegethoff at Lissa; by the Japanese at Yalu and Tsushima; and it will be used in the battle of to-morrow.

Darrieus has summed up the movements to be used on the field of battle in a very few words as follows: "The best movements to make upon the field of battle necessarily depend upon those of the enemy, upon his activity, his initiative, his morale. Such a movement, dangerous against a resolute opponent, will be perfectly proper and will make complete success easy against another who is demoralized."

2. *Position of the Commander-in-Chief.*—Looking back through history we find that the position of the commander-in-chief has varied; sometimes he was at the head of the column, and sometimes in the center. For a short time after the battle of Ushant, the commander-in-chief was placed on the unengaged side of the line. In general, however, his position was in the center of the line. In one case, that of Farragut at Mobile Bay, the leader took the second place. This was done at the earnest solicitation of some of Farragut's officers and he expressed great regret, after the battle, at having yielded to them. This was the only battle in which Farragut did not lead.

It was the common custom in the days of Nelson for the commander-in-chief to place himself in the center of the line. It is true that both Nelson and Collingwood led their respective columns at Trafalgar; but, at both Copenhagen and the Nile, Nelson took his position in the center of the line. He did this on account of his lack of knowledge of the ground, and the desire on his part to avoid having the flagship run aground. In practically every other battle of that time we find the commander-in-chief in the center of the line.

The position on the unengaged side of the line was adopted by the French after the battle of Ushant in 1778. It so happened

during this battle that a signal to the van was either misunderstood or ignored, and the movement was not made in accordance with the wishes of the commander-in-chief. As a result of this the French placed their commander-in-chief in a frigate stationed on the unengaged side of the line of battle. Their example was followed soon after by the English, although it was later discontinued by both nations.

Of late years this question has been the subject of a great many arguments in which the following positions have been discussed:

(a) At the head of the line.

(b) In the center of the line.

(c) On the unengaged side of the line.

The advocates of the position at the head of the line claim that this will obviate, to a large extent, the use of signals in the handling of the fleet in battle, and will do away with them entirely when making a simple change in course. Other advantages are the ability of the commander-in-chief to reply to any movement of the enemy at the earliest possible moment without losing any time in making signals, and that the rest of the fleet simply follow in the wake of the flagship. It is upon this theory that the "follow the leader" plan of battle is founded.

The disadvantages of the leading position are that the commander-in-chief is unable to see everything that is going on in the column; that it ties all the ships to the course of the flagship, thereby stifling, to a large extent, the initiative of the division commanders; that it increases the time necessary for the proper understanding of any signal, and increases the chance of its being misunderstood; and that, should the flagship suddenly sheer out due to the breaking down of its engines or steering gear, after the signal apparatus had been shot away, it might cause disaster. Furthermore, this position is not compatible with the system of group column mentioned in the preceding section.

The position in the center of the line is not much better, if any. While the conditions for signalling may be slightly improved, it, like the position at the head of the line, ties the commander-in-chief to one place, which is a condition that should be avoided as much as possible. It sacrifices the greatest advantage of the position at the head of the line—the power to initiate changes of course without the necessity of signalling. Under the ever-changing conditions of the modern battle, the commander-in-chief should

not be restricted to any one position, but left free to go wherever he thinks his presence is necessary.

Placing the flagship on the unengaged side of the line is the best possible place, in that it enables the commander-in-chief to see all that is going on in the line; to proceed to any part of the field of battle as may be necessary without being compelled to make any signals to prevent other ships from following him; and to use all the various weapons at his command to the best advantage without being distracted by the necessity of initiating all the different changes of course. He can tell when the proper time arrives to make the torpedo-boat attack, or when to use his submarines. With group commanders thoroughly trained in battle tactics, and fully informed concerning the plan of battle, the commander-in-chief may safely assume the position on the unengaged side. From this position he can more easily observe the working of the plan of battle and the manner in which the group commanders exercise their initiative. Under these conditions there should be little use for signals, and those which are made can be more easily understood. Furthermore, in taking this position the commander-in-chief is in a position to correct any errors made by the group commanders in carrying out the plan of battle.

The critics of this position have said that this method takes a capital ship from the line of battle, where every ship is needed. They also claim that the commander-in-chief will not be able to see so well as at the head of the line on account of the powder gases and the interference of ships; and that he must make signals for any maneuver which he wishes to perform.

Napoleon once said, "When you wish to fight a battle, assemble all your forces; do not neglect any; one battalion sometimes decides the fate of a day." This might well read, "One ship sometimes decides the fate of a day." Granted, that in placing the commander-in-chief on the unengaged side of the line, we have taken a ship from the main battle-line. But is it not to our advantage to do so?

The ship has been so placed that it may be taken, with the least amount of trouble, to any part of the field of battle, thereby playing the part of a reserve, in addition to the moral aid given by the presence of the commander-in-chief. Its weight, thrown into the scale at the critical point of the engagement, may be enough to decide the victory. Reserves, as such, are not to be thought of in

a naval battle, and that is not the primary reason for placing the commander-in-chief in the position advocated. This position fits in well with our system of group control and gives the commander-in-chief an opportunity to watch the progress of the battle with much better results than if his ship were in the thick of the fight.

So far as the other objections are concerned, the answers are obvious. He can see as well from this position as he can from the head of the line and with much less to distract his attention. As regards signals, as has already been said, there will be very little use for them once our group commanders are properly trained and indoctrinated with the tactical views of the commander-in-chief.

To sum up, it would seem that the choice lies between the position at the head of the line and the one on the unengaged side. In the lead, the commander-in-chief is able to incite everyone by his example, which, of course, has its advantages; but, with the enemy concentrating upon the flagship, it might be only a short time before the fleet lost its leader. In the other position the fleet could retain its leader for a longer time, and it is not necessary to lose the effect of the example of the commander-in-chief, for, at the critical point in the fight, the flagship can easily go to that group requiring assistance.

All the advantages rest with the position on the unengaged side of the line and, although we are unable to give the naval commander all the advantages possessed by the general of an army, let us give him all we can.

3. *Torpedo Craft.*—The rôle to be played by torpedo craft in the battle of to-day is, in the main, theoretical. History furnishes us with no data upon which to base our use of these craft. The only vessel, in any way comparable with the modern destroyer, was the fire-ship which has already been mentioned. From the time of the disappearance of the fire-ship from the sea-going fleet, in the early part of the eighteenth century, there was nothing to take its place until the advent of the small torpedo boat, toward the end of the nineteenth century. Small, with poor sea-keeping qualities, and lacking speed, they were not destined to remain long a part of the fleet. In 1889 Mahan prophesied their disappearance, and it was very soon after that they ceased to be a part of the battle fleet.

That the large sea-going destroyer of the present time should have become a most necessary adjunct of the battle fleet is simply a natural evolution of the torpedo boat. The small torpedo boat of the early nineties was driven from the battle fleet by its inability to keep the sea, and it has been succeeded by the large destroyer whose ability to stay at sea, under all conditions, has been most conclusively demonstrated. What their part will be in the next great sea fight is a matter of conjecture, and the results from well thought-out exercises. As Tsushima, the state of the sea prevented the use of torpedo boats during the fight itself, although they were able to put to sea along towards the evening and to assist in "finishing" the Russians.

The uses of the destroyer in battle may be placed under the following heads:

(a) Attacking the head of the enemy's column.

(b) Attacking the rear, or some other portion, of the enemy's formation.

(c) Repelling attacks of the enemy's destroyers.

(d) Sinking the enemy's submarines after the aeroplanes have found them.

(e) Assisting in the destruction of the enemy's fleet after the battle has been decided.

Of these various uses the first two are very much alike. In each case the boats will do much to demoralize an enemy, and to throw him into confusion, but in the first case they will usually compel him to maneuver under fire from the main battle fleet.

The value of destroyers in turning the head of a column was most aptly shown on August 10, 1904, when the Russian fleet attempted to escape to Vladivostok. With an excellent opportunity to strike a telling blow at the Japanese navy, they became panic-stricken at the sight of the flotilla of destroyers which the Japanese threw across their course. Filled with an over-whelming fear of this cloud of wasps, they turned and fled back to Port Arthur, there to remain until the fall of that port. Also, during the French maneuvers in the summer of 1912, the destroyers were repeatedly signalled to charge the head of the column.

In addition to forcing the enemy to maneuver under fire, an attack by destroyers demoralizes him, disconcerts his fire-control, and throws him into confusion, as already stated. Forced to divert his attention from the main battle, and momentarily expecting the

blow of the torpedo, the morale of the enemy is bound to suffer severely.

The question now arises as to the best way in which to ward off a destroyer attack. The best method would seem to be that of using a flotilla of destroyers. Seeing the attack coming, the commander of the flotilla would proceed to meet it, holding it in check until the arrival of aid, or driving them off entirely, if strong enough to do so. In this way the fire-control would be disturbed as little as possible, and the morale would not be affected so seriously.

During the battle, then, the destroyer would have a double duty to perform—to prevent the enemy's destroyers from attacking the column, particularly the head, thereby obviating the necessity for maneuvering while under fire; and to attack the head of the enemy's line, driving their attack home through the defending destroyers and forcing him to maneuver under fire.

The only other use of destroyers in battle would be to find and sink any of the enemy's submarines. In this duty they would have to act in concert with the aeroplanes. An instance of this occurred during the British maneuvers in 1912, when a submarine, first sighted by an aeroplane, was located and sunk by a destroyer.

The work of the destroyers in assisting in the destruction of the enemy's fleet after the battle has been decided is not properly a part of battle tactics, and needs no explanation here.

The other type of torpedo craft now coming into prominence is the submarine, which is passing through the same conditions as applied to the destroyer. A purely defensive weapon at first, its increasing size, speed, and cruising radius are rapidly making it an offensive weapon. For this reason it is only a question of time until the submarines will become a part of the cruising fleet. Even now the "F" class of British submarines, of 1200 tons displacement, are reported to be able to make twenty knots on the surface, and sixteen knots when submerged. The following quotation from the *Army & Navy Gazette* shows the trend of thought in this connection; "From a coastal weapon of doubtful utility it has grown into an ocean going vessel, and the defensive ideas associated with it have given place to a recognition of its potentialities as a weapon of offense."

In the INSTITUTE PROCEEDINGS for December, 1912, Lieutenant Nimitz discussed the subject of submarine attacks. In his article,

he suggests maneuvering the enemy into the zone covered by the submarines. All very good, but why wait for that? If the enemy refuses to maneuver into the submarine zone, the submarine will be compelled to go after him, so nothing will be gained by waiting.

Submarines can be used in very much the same manner during the battle as the destroyers. With the increasing speed of the submarines they can easily proceed to any part of the field of battle, and attack any part of the enemy's formation. In this, of course, they are greatly aided by their invisibility. Throwing them across the course of the enemy's fleet will certainly cause the enemy to do some maneuvering, and should give the side whose submarines are making the attack a considerable advantage.

In all cases of submarine attack, the effect on the morale must be considered. And the effect on the morale, of a submarine attack, will be much greater than that caused by destroyer attack, on account of the invisibility of the submarine. For instance, knowing the conditions in the Port Arthur fleet on August 10, when they sighted the torpedo boats across their course, try to imagine what it would have been had the Russians sighted the periscopes of a group of submarines instead of the destroyers. Reasoning from what actually did happen, the result would have been worse than chaos.

What is the best way to repel a submarine attack? The very difficulty of repelling the attack, the advantage which the submarine has over the battleship, are the reasons for the great moral effect of the submarine attack. The battleship is practically defenseless against the submarine and can escape, with certainty, only by running away. Even then, as Lieutenant Nimitz points out, it may be running into another group of submarines. Can the submarine be sunk by gun-fire? The same writer says that an anchored submarine, submerged to a depth of ten feet, has been sunk by heavy gun fire at comparatively short range.

There are, then, three methods of meeting the submarine attack, one of which is meeting it in a negative manner; (1) running away from the submarines: (2) heavy gun-fire, using main battery guns for better effect, and (3) the use of aeroplanes and destroyers, as mentioned in discussing the use of destroyers.

After considering these methods we find that the first two will give the enemy a decided advantage, as in both cases our fire slackens or ceases altogether, giving him a breathing spell, and

allowing him to continue his fire undisturbed. The third method, obviously, cannot be used when the submarines are between the two battle fleets, since it would be fool-hardy to send the destroyers in after them. What, then, should we do? Apparently it is a case of selecting the lesser evil, and in this selection, the conditions must be considered. Each group commander will have to decide for himself as to what it is best to do. At one stage of the battle he might endeavor to sink the submarines; while at another he could safely run away from them. Outside the zone of fire, the destroyers and aeroplanes could be used with safety.

4. *Fast Wing.* The question of speed in ships of the battle line is one which has been discussed many times, so it is entirely unnecessary to go over it again. In order to obtain a high speed in a battleship something must be sacrificed, either armor or armament, and the true worth of the sacrifice will be known definitely only after it has stood the test of battle. "Speed," says Daveluy, "should be the principal element of scouts which are not built with a view to fighting, or of torpedo boats upon which it is closely allied with the use of the torpedo, but for fighting ships it should be subordinated to the destructive power which is the raison d'etre of a ship." And yet, at least four of the first seven leading naval powers are building the so-called battle-cruiser, of twenty-five knots or more. Three of the four powers referred to are giving their cruisers from twenty-eight to thirty knots. The building of these ships would seem to indicate that it was expected to make some use of this high speed in the battles of the future. How then, are they to be used?

Armed with the large guns of a battleship, and protected with from nine to twelve inches of armor, they are too heavy for mere commerce destroying. Built, apparently, with a view to fighting, they are too powerful for scouting purposes only. Strong enough to drive off all but battleships, and well able to cope with them, they may be used in the screen until the day of battle, when they will join the main line as a fast wing. As a fast wing they may be put to one of the following uses:

(1) To win an advantageous position with regard to the enemy's line.

(2) To prevent the cap.

(3) To pursue the enemy's ships after the battle and capture or destroy them.

The first of these uses may be further sub-divided.

(1) To cap the enemy's fleet.

(2) To attack weak portions of the enemy's line.

By far the most important use of the fast wing will be that of capping, or attacking, the head of the enemy's formation. An attack of this kind will be very apt to have the same effect as a similar attack by destroyers; it will force the enemy to maneuver under fire. It will not, however, have an effect upon the morale equal to that of a destroyer or submarine attack. The fast wing division can be used to cross and enfilade the tail of the formation, but it will have a much more decisive effect when attacking the head of the line.

The advantages of a fast wing were brought out most strikingly during the French maneuvers in 1912, which have been referred to before. On one occasion they used some cruisers, representing battle cruisers, to cap the opposing fleet and at the same time made a destroyer attack. The next day the Red Fleet concentrated upon the head of the Blue Fleet while the fast wing attacked the rear of the formation. One of the signals most frequently used during these exercises was, "Cruisers T the enemy."

Under the present conditions our interest is centered in the manner in which a fast wing attack is to be repelled. And it is plainly impossible to lay down any hard and fast rule for the accomplishment of this. The method, or maneuver, to be used must be governed by circumstances. If the fast wing attacks the head of the formation, we do one thing; if it attacks the tail, another. In either case we must not allow ourselves to be restricted to any one maneuver, but must do that which will most readily attain the desired object.

The number of ships in each fleet has a bearing on the proper evolution, also. Let us suppose that the number of ships in the main battle-line of each fleet is the same, but that the enemy has a fast wing division in addition. Except under the most advantageous conditions, it would hardly do to send one division to contain the fast wing. On the other hand, with the total numbers equal, one division might be used to repel the battle-cruisers. Again, it might be advantageous to turn and endeavor to concentrate upon the tail of the enemy's fleet, thereby gaining an advantage which might offset the fast wing attack and allow us to meet the attack under more favorable conditions.

To attempt to go into this subject in detail in a paper of this scope would require too much space and time, and each one will have to work out the details for himself; just as each commander-in-chief will have to solve the problem, with all its various combinations, as it is placed before him.

5. *Aeroplanes.* The uses to which aeroplanes may be put in battle, at the present time, are extremely limited. As a weapon of offense they are practically useless. Most writers on the subject of aircraft in battle are agreed that the principal use of these machines will be found in the carrying of information; the locating of enemy's submarines; their use by spotters; and, possibly, dropping bombs, as well as their use for scouting purposes.

For distinctly offensive work they are confined to attacks on the enemy's air-fleet, and the last use just mentioned above—dropping bombs. At its best, dropping bombs, especially upon a target the size of a ship, will be very inaccurate. Then, too, it is not, at present, possible to carry a sufficient number of the required size. There is also the attendant risk to the aviator when carrying bombs. Bomb dropping, for the reasons mentioned above, was abandoned by the Italians after trying it in Tripoli. So this may, it would seem, be safely omitted from our calculations at the present time.

Their use in locating submarines and mines has already been mentioned, and need not be gone into again.

To be used by spotters with anything approaching good results, the machines must be fitted with an efficient wireless set of short range, say five miles. A longer range would, of course, be an added advantage to this type of craft when engaged in scouting. While experiments have been, and are being, made with regard to a wireless installation for air-craft, the writer has no definite information at hand regarding the results attained; although it is said that the problem has practically been solved, there being a few minor points left to be cleared up.

For spotting work, the advantages of the aeroplane, due to its height above the sea and closer proximity to the enemy, are obvious. But, can its results be acted upon as quickly as those obtained by the spotters on board ship? Will its use result in a decreased rate of fire? Will the transmission of spotting information by wireless be entirely free from error?

Undoubtedly the radio operators engaged in this work will have to be of the best, but there is always a possibility of the signal being lost entirely or misunderstood through the interference set up by the enemy's operators. These questions, like many others in tactics, will have to be answered by experience; by the carrying out of a well-devised scheme of tactical drills which simulate, as closely as possible, the conditions of battle.

CONCLUSION

Briefly, the following are the points brought out:

(1) That no absolute rule can be laid down with regard to the formations and evolutions necessary to win victory.

(2) That a system of group control, or column—either by divisions or squadrons—is better than the single column, as it allows the group commanders to exercise their initiative more freely, and does not confine them to the "Follow the leader" plan of battle. It will permit group commanders to seize opportunities which might otherwise be lost.

(3) That the commander-in-chief should not be restricted to any one position, but free to go where necessity dictates; and should be, at least in the beginning, on the unengaged side of the formation.

(4) That torpedo craft-destroyers and submarines—should be used to charge the enemy's fleet, in order to create confusion and loss of morale.

(5) That battle-cruisers will have a duty to perform in the next great naval battle, in compelling the enemy to maneuver under fire, or holding him in a disadvantageous position.

(6) That the most important duty of aeroplanes, during battle, will be locating the enemy's submarines and for spotting.

It may be said that this paper is too general; that it does not go into the details of battle tactics. To go into all the details of the various movements necessary to win a battle would be an endless task. Each battle presents its own problem, and it must be solved under the terms of that problem. It would, of course, be comparatively easy to select some hypothetical conditions and then work out an answer; but the result would not hold, in its entirety, for the next set of conditions. Some of the operations and principles involved in the first solution could be used in the second; while others would, perforce, have to be abandoned and others

substituted. Under other conditions some principles could be violated with impunity.

"A principle," says Bernhardi, "must never become a rule, a schematic form, which kills the spirit and becomes a trammel to action, and a mannerism in the art; for all so-called principles and principal measures in war are subject to a higher general law—namely, to that of expediency, and can only be recognized as actual principles in so far as they are expedient."

And yet there is one principle towards the fulfillment of which our tactics must tend—namely, to bringing the greatest number of effective guns to bear upon the enemy at effective ranges in the shortest time, or, in one word, concentration. This principle of warfare has been recognized and practised since man first began to fight his fellow man, and it will be practised until the day of universal peace. History abounds in examples of concentration in battle. One can hardly read the history of any battle without finding that the victor concentrated upon the weak portion of the enemy's formation.

No effort has been made to lay down any new principles of naval warfare—theoretical or otherwise—but simply to place together some of the factors and conditions which must be confronted and studied when going into battle with the various types of ships which go to make up the modern fleet.

Books have been written upon tactics in general, and articles upon the tactics of battleships, destroyers, submarines, and the uses of aeroplanes, and this paper is merely an attempt at combining, in a general way, the tactics of the various parts of our battle line. Just as the general of an army must know how to use his infantry, cavalry and artillery in battle, so must we know how to use our different types of ships.

And studied they must be, for no man is born a genius. The genius differs from other men in that he is continually learning new principles; new applications for old principles; that he does not allow himself to be bound by any principle but knows when to reject all established methods and to do the unexpected. Commander Schofield clearly characterized the difference between the genius and the ordinary man when he said, "The genius differs from other men in this, that he may soon dispense with his guide and become in turn a creator, to leap forward in his career, like the eagle which soars confidently forth after its first fluttering

attempts. But the true genius never ceases to work on that greatest and most wonderful of physical things, the human mind. Always he is building it up by the untiring efforts of a will that has an end in view."

On the other hand, it must not be supposed that battles can be won by study alone. Granted, that the more knowledge concerning the art of warfare possessed by the commander, the better his chances for success. But he must possess other qualities besides that of knowledge. He must be energetic, bold, courageous; must possess tact and ability to handle men, to make them work together cheerfully for the end in view. He must be able to recognize the psychological moment when it arrives, and know just what to do at that time; just as the commander of an army recognizes the proper moment to order the counter-charge. For, as Bernhardi says, "It is on the free application of what is fundamental under the constantly changing conditions and purposes of action that the art of conducting war is founded."

The ill-fated Admiral Makaroff has expressed this point in fewer words: "A man instructed in all the rules of war may prove very much out of place in the matter of commanding in battle, but a talented man who has never studied the subject in any way is also as fully out of place. It is only by union of talent with moral force, knowledge, and wisdom that the needs of war can be supplied."

So we must study, not only the history of the past, learning the principles and methods applicable to the ships and weapons of that day, and the principles which may, or can be made to, apply to the weapons of to-day, but also the art of command. And for this part of our study we can find no better example to follow than that of Nelson. But woe be to that nation whose fleet goes into battle commanded by men who have not done their utmost to master the art of warfare in all its branches.

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A PLEA FOR THE BATTLE-CRUISER

By Assistant Naval Constructor B. S. Bullard, U. S. Navy

Prior to the introduction of steam for the propulsive element and of iron or steel for the construction of the hulls of fighting ships, the frigates, fast, comparatively lightly armed sailing vessels, performed all of the multitudinous duties which tactical and strategical considerations of the present day allot to the cruiser. This class of vessel carried on the scouting or despatch service; acted as protectors or destroyers of commerce; took their place in line of battle in concerted fleet action; performed all the duties connected with detached service; and their value as part of any naval establishment which, in time of war, aimed at the control of the sea, was fully recognized and universally understood. However, the true worth of the cruiser was forgotten in the tumultuous wave of enthusiasm which swept over England and France, the leading maritime nations of the period, when wrought iron was introduced in warships for the protection of the ships and of the gun-crews against shell fire. The introduction of armor led to a controversy among the world's leading naval architects upon the relative merits of the casemate ship, where all the guns were grouped in an armored casemate amidships, and the turret ship, where all the guns were isolated in separate armored turrets, but where nearly all of the units comprising a ship's main battery could be brought to bear upon any point of the horizon. These and many other momentous questions connected with the heavily armored first-line or ironclad ships occupied the attention of the naval architects of England and France during this period and the frigate or cruiser's natural course of development, parallel to that of the heavier ships, was cast into the shadow. In spite of this halt in the development of the cruiser, all of the considera-

tions which had served to bring this type of fighting ship into existence remained as integral parts of the plan of any great naval campaign of that time, of the present or of the future.

It remained for the Confederate cruiser *Alabama,* during the Civil War in this country, to once again bring the question of the value and power of the cruiser to the attention of naval officers and of other officials upon whose shoulders rested the burden of the proper naval development for their respective nations. This vessel was of but moderate size, carried a not very powerful armament and was not fast, but in spite of these limitations in tactical and fighting qualities, the *Alabama* succeeded in inflicting great damage upon the commerce of the northern states and roamed the sea almost at will until she was finally cornered, and beaten, by the *Kearsarge* in that memorable sea fight off the coast of France.

The success of the *Alabama* gave a great impulse to the construction of this class of vessel among the leading nations of the world, and accordingly many ships of the cruiser type were laid down. In the United States the *Wompanoag* class, about 4000 tons displacement, was projected, but due to the reaction that followed the turbulent scenes of the Civil War and the wane of interest in all naval matters, the *Wompanoag* was the only one of the class completed, and this vessel was in a sense a failure. The problem was too difficult for solution with the limited technical resources at that time available in this country. The hull, constructed of wood, was found to be too weak to resist the great stresses brought to bear upon it, the machinery was heavy and cumbersome and occupied so much space that it was found impossible to properly house the crew necessary for the efficient working of the guns, and finally the vessel was so overloaded that she never made her designed speed.

In England and France ships with both sail and steam power of the cruiser or light high-speed type were laid down. Sail power was considered essential for a cruiser because of the necessity for a great radius of action. Great endurance could only be obtained at that time by the employment of sail power as auxiliary to the steam, but a very limited supply of fuel could be carried. This adherence to the use of sails in cruisers made this class of vessel in a great measure self-supporting and independent of any base for fuel supply. The very limited amount of coal could be

harbored by cruising under sails, making use of the engines only when a greater speed was required.

The first cruisers, although built of iron, and in some cases of iron sheathed with wood and copper, had no protection against gun-fire and relied solely on their speed, which was sensibly higher than that of the armored ships of the same date, to escape an action which could only result in disaster. Against vessels of the same or parallel classes the outcome of any engagement depended more upon the personnel than upon the matériel.

The development of the rapid- or quick-firing guns, and their introduction into the navies of the world, led to the adoption of some protection for the light cruisers and the first of the so-called protective cruisers made its appearance. This type of vessel had a light, semi-armored deck, which in the first ships was flat and only partial in extent, covering only the machinery spaces. The next step in the development was the complete armored deck, with sloping sides, combined with a cellular structure extending above the armored deck in the region of the water-line, and longitudinal coal bunkers along the sides of the ship abreast the machinery spaces. These protected cruisers are well illustrated by the horde of cruisers of all descriptions built by Great Britain, starting with the *Inconstant* and culminating in size in the *Terrible* class of 14,000 tons displacement. These ships, as they advanced in size by successive steps, early abandoned the use of sails when the fuel-carrying capacity and the economy of the engines were increased. This type, although presenting an enormous unprotected target and manifestly unable to engage in action against armored ships, found many admirers in England, chief among whom was Lord Armstrong, who advocated their use to the abolishment of the armor-clad.

During the decade from 1880 to 1890, and even earlier, sporadic attempts were made to protect cruisers with side armor; but these first ships were not *armored cruisers* in the strictest sense of the word, in that they did not possess the relative high speed which was, and still is, the prime requisite for a ship to be classed as a pure cruiser type. They were in reality nothing more than reduced copies of the armor-clads of the same period, and as such were not efficient either as armor-clads or as cruisers.

During the first years of the development of modern armored fighting ships, France looked upon England as her most probable

enemy and accordingly endeavored to keep her navy on an equal footing with that of the British Empire. However, England's policy of meeting each class of vessel constructed by any foreign power with more powerful vessels of the same type, caused the design and construction of armored ships to be so actively carried on that France, due to lack of resources, found herself unable to keep the pace. The gradual retrogression of the French Navy, as compared with that of Great Britain, forced the French naval architects and strategists to seek some other field of warship construction where supremacy could be attained. Profiting by the experience of the Napoleonic wars and knowing full well that England depended mainly on her imports for her maintenance, commerce destroying presented itself as the logical solution of the difficulty and a naval program, based to some extent upon this phase or feature of naval warfare, was established. The French seem to have realized almost at once how utterly unfitted a large ship with no side protection was for use in action against armor-clads and they accordingly approached the problem of fitting side armor to the cruiser. The development of rapid firers and the advent of the high explosive shell had rendered the vulnerable protected cruiser in a great sense obsolete for participation in any action whatsoever. Experiments with high explosives conducted by the French against an old vessel, *La Belliqueuse,* showed the necessity of providing a much more extensive protection to the sides of cruisers than had even been thought of. On the other hand, it was found that such side armor need only be of moderate thickness to keep out high explosive shell.

In 1888 the French naval authorities commenced the construction of the *Dupuy-de-Lôme,* of 6500 tons displacement and 20 knots speed. The sides of this vessel were completely covered with 4-inch armor from the main deck to 3 feet 9 inches below the water line. A 2-inch vaulted deck was fitted with a splinter deck beneath in way of the engine and boiler rooms and the space between these two decks was filled with coal. Behind the belt was a 3-foot cofferdam filled with cellulose.

The armament of this type ship consisted of two 7.6-inch and six 6.4-inch guns, all placed in single turrets on the main deck except one 6.4-inch, which was placed in a single turret on the forecastle. This arrangement of the battery was peculiar, in that the heavier guns were placed amidships, one on each side

and the smaller guns in groups of three forward and three aft. All the guns had longitudinal fire so that the French were able to retain their principle of having the same number of guns bear on every point of the horizon.

This remarkable ship marked the beginning of a new epoch in cruiser construction and the date of her launching, 1890, marks the birth, if it may be called that, of the armored cruiser. In the decade which followed, 1890 to 1900, the construction of armored cruisers was actively pursued by almost all nations, and by the latter date it may be said that the protected cruiser had become obsolete for anything other than the performance of minor duties in time of war and for police service in time of peace.

The cruisers following the *Dupuy-de-Lôme,* constructed by other countries and even those built in France, did not carry the same proportionate area of side protection as did the original type ship, but their side armor protection gradually came to follow the arrangement found most suited for the battleships.* Here we see the beginning of the modern battle-cruiser. The type ship was far different from the armor-clads of the same date, having a different system of protection and a much higher speed, but gradually the armor and the installation of the main battery approached the arrangement in vogue for battleships, while the speed remained relatively greater. Thus, in the highest developed armored cruisers, greater speed and inferior armament are the chief differences between the cruiser and the battleship types. The tendency at all times seemed to be toward a merging of the two types. Then came the dreadnought type of battleship and in the twinkling of an eyelash the entire principles of large warship design were revolutionized. This change in battleship design naturally led to a similar change in cruiser design and the first of the battle-cruisers made its appearance. That the introduction of this type was inevitable can be seen by bearing in mind the similarity of the pre-dreadnought battleships and the now obsolete armored cruisers.

In the United States the *Tennessee* class marks the highest development of the armored cruiser, and these ships are in fact the last class of large cruiser constructed in this country. These four ships are the only cruisers of the United States Navy which can even in a small measure be considered first-line ships. While this nation has stood still in the construction of the cruiser, other

leading nations of the world have pushed forward and now find themselves with at least one division of battle-cruisers as an integral part of their first-line fleet.

The fighting capacity of the battle-cruiser is such that its employment in future fleet engagements is a certainty and even in an action in which the United States fleet might be one of the participants, the cruisers of the *Tennessee* class would more than probably be used as auxiliaries to the main fleet. These ships would be used at least as long as the main fleet consisted of a heterogeneous collection of dreadnoughts and pre-dreadnoughts as it does at present and as long as these cruisers are the only vessels available for the performance of the duties allotted to the large cruiser. The speed of a fleet is only equal to the speed of its slowest unit and until the fleet is composed of one type of ship with the present-day battleship speed, the *Tennessee* class will have the 25 per cent advantage in speed over the battleships which is considered the minimum superiority necessary for the cruiser. On the other hand, the present-day battleship has a speed of about 21 knots on the average, so that the 22 knots of the *Tennessee* would not be any appreciable advantage over battleships of an opposing power.

The foregoing statements may be considered as somewhat introductory and also as a more or less brief historical review of the development of the cruiser. There now remains the consideration of the question of the burden which may be placed upon the large cruiser in time of war and what duties this class may be called upon to perform or what, in other words, may be called the requirements of the service.

The tactical and strategical duties, on which the successful issue of a naval campaign depends, seem to have received but little thought in the development of the cruiser in the United States Navy. This development has apparently been undertaken with commerce destroying as its ultimate object, as is evidenced by the fact that only the *Tennessee* class has been armed with what may be considered the minimum caliber for armor piercing, namely, the 10-inch gun. Commerce destroying is relatively unimportant for this country and therefore the design and construction of cruisers should not be undertaken by the United States with only this phase of warfare in view. The consideration of true military duties should be paramount and should take precedence over duties relating to the protection or destruction of commerce. This last

may be a part of a nation's strategical plan, but control of the sea will be the truly vital issue at stake in any naval campaign. This control of the sea can only be attained by defeating or effectively bottling up the main fleet of the enemy, and it will only be after such control of the sea is attained that side issues, such as commerce destruction, will play anything but very minor parts. This principle must be paramount and upon it and it alone should the design of the most suitable types of all classes of warships be undertaken. Careful and exhaustive study should be made of each type before final adoption, because once a type is constructed, tacticians, the workmen to whom the tools of naval warfare are entrusted, will be forced to accept that type's limitations as well as its virtues.

Fashions in warships like fashions in dress change with the passage of years, but unlike changes in dress some precedent can usually be discovered for the radical changes which have occurred in the design of different types of warships. The fundamental conception of a cruiser is that of a warship of above 1500 tons whose relative speed is at least 25 per cent greater than the speed of the large first-line ships. Speed is a virtue of both large and small cruisers alike, but where large ships can be adapted to perform the duties of small ships, the converse is obviously untrue, and small ships, even in a measure, cannot perform the duties that fall upon the largest class of cruiser. It is due to this fundamental truism and also to the fact that during the development of the cruiser, the necessary similarity which must be kept between the battleship and the cruiser was subconsciously realized, that this type of warship has steadily followed the path of increased displacements. The United States kept abreast of the progress in the development of the cruiser up until the *Tennessee* class was constructed, but in the past ten years the construction of the large cruiser has been entirely abandoned by this country and such abandonment would suggest that the need for the type had passed entirely out of the realm of naval strategy. Such, however, is not the case, as can be seen by an examination of the military duties which can and should be assigned to cruisers of the largest type.

The importance and the use to which superiority of speed in fleet action can be put was admirably shown by Admiral Togo at the Battle of Tsushima. The armored cruisers, in which lay

the Japanese superiority in speed, were of the old type of cruiser, that is, of the type to which the *Tennessee* belongs, but this able tactician fully demonstrated the usefulness of speed with the tools at his disposal. However, even the success he attained only served to accentuate the fact that, to derive the full benefit of any superiority in speed, the ships possessing it should be armed and protected in such a manner as to engage the battleships of the enemy's main fleet upon an equal footing. Such a condition would be manifestly unattainable at the present day by ships constructed on the design in vogue for armored cruisers of a decade back. This has been precluded by the development of the battleships into the dreadnought type and the gradual increase of speed that paralleled this radical departure in design. This unimpeachable fact has been realized and acted upon by all leading nations except the United States, with the result that, at the present date, these nations have a squadron of battle-cruisers which can be called upon to play their part in enveloping movements in fleet action and which have the necessary superiority in speed for the pursuit of any ship of the enemy which may endeavor to escape during or after an engagement.

Most of the knowledge of the conditions of modern warfare upon the sea must be gleaned from the study of the Russo-Japanese War because of the lack of authentic data upon the few naval actions which have taken place to date in the current European War, although some absolutely self-evident points are shown which will be touched upon at some length in the latter part of this paper. From the Battle of Tsushima we learn that the tacticians in command of both the Japanese and the Russian fleets found it necessary or advisable to reconnoiter in force when an action was imminent. Such a reconnoitering squadron, to best accomplish its purpose, will always have to break through the enemy's screen and such breaking through will necessitate considerable fighting power and superior speed, not necessarily to the light ships which form the screen but to the main body of the enemy's battleships.

For scouting purposes and for the blockade of military ports small vessels will be required, and obviously these smaller ships must be supported and assisted by more powerful ships. These supporting ships will need high speed in order to avoid being cut off by a superior number of the enemy's battleships. If

these supporting ships are of the battle-cruiser type they will have nought to fear from a numerically equal body of the enemy, even though the detachment be a part of the enemy's main fleet, as their superior speed will enable them to escape any action which might result in disaster.

For independent service on distant stations where large fighting power is required, either for military demonstrations or for operations of secondary magnitude, high speed and great endurance are the prime requisites, although efficient gun power and protection should not be left entirely out of consideration.

The military duties which fall upon the cruiser have been briefly stated in the above paragraphs and may be summed up as follows: (1) Tactical or fleet duties; (2) Reconnaissance in force; (3) Support of scouts or of other light vessels on blockade duty or which form the screen for the main fleet; (4) Independent expeditions.

Of these four duties it will probably be admitted that the first and second are by far of the greatest importance and should therefore be given the greatest weight in selecting the type of large cruiser to best fulfill all the requirements of the service. Any nation which aspires to keep in the front rank of the great naval powers of the world must possess cruisers which are capable of performing these two fundamental duties.

For tactical considerations in fleet action large cruisers should be nothing more than higher speed battleships, and in fact this is exactly what the name battle-cruiser implies. They should be ships of higher speed than the battleships and should carry as powerful guns and be as efficiently protected. The three most important elements in warship design are armament, protection and speed. To obtain an increased speed greater weight must be allotted to the machinery and its appurtenances, and if the armament and protection are to remain the same the only method left by which increased speed can be obtained is by increased displacement. Hence, of necessity, battle-cruisers to be most efficient must always be larger than contemporary battleships. This increase of displacement can best be taken care of by increasing the length over that of contemporary battleships, while the beam and draft are kept the same. This will give a finer ship and should give relatively easier driving.

Any ship of the type just briefly described will naturally cost a great deal more than the corresponding battleship and this fact is made their greatest argument by the opponents of the type. Naval expenditures have increased enormously during the past 10 years and a state has been reached where any proposed increase in the cost of the naval establishment of a nation should be approached in a very cautious manner. The construction of battle-cruisers, however, would be an economy rather than an added expenditure. A proper proportion of battle-cruisers is about one to four, that is, for every four battleships there should be one battle-cruiser. Thus in a fleet such as the United States Atlantic fleet, consisting of 21 battleships, there should be a cruiser division consisting of five battle-cruisers. Superior speed is much more advantageous before than it is during an action, and a fleet which includes a division of these fast battle-cruisers will possess all the superiority in speed over an enemy's main body that most naval authorities consider necessary. Thus by the construction of one battle-cruiser for every four battleships laid down the necessary superiority in speed will be obtained and at the same time the battleships can be kept within a reasonable displacement and speed and the increased cost of each new type of increasing size battleships can be summarily stopped, or, if not entirely stopped, greatly diminished. Following this line of argument, although the cost of battle-cruisers will far exceed that of battleships, the gain from the halt in increased battleships speed and displacement will far outweigh the increased cost attendant to the construction of battle-cruisers.

What in a sense may be termed a reconnaissance in force is exemplified during the current war by the engagement between the British and German battle-cruiser squadrons in the North Sea. Apparently the German object was not so much a reconnaissance in force as it was a repetition of the attack made some weeks before upon the coast of England. The British object on the other hand could have been nothing else as there is no evidence of any intention of attack upon Helgoland or of any of the mine infested German North Sea coast. The principal characteristics of the ships engaged in this action as taken from Jane's "Fighting Ships," 1914, are tabulated below for comparison and study.

BRITISH

Ship	Date	Displacement	Main Battery	Designed Speed
Lion	1910	26,350	8 13.5"	28
Tiger	1913	27,000	8 13.5"	27
Princess Royal	1911	26,350	8 13.5"	28
New Zealand	1911	18,750	8 12"	25
Indomitable	1907	17,250	8 12"	25

GERMAN

Derfflinger	1913	28,000	8 12"	..
Seydlitz	1912	25,000	10 11"	26.5
Moltke	1910	23,000	10 11"	27
Bluecher	1908	15,500	12 8.2"	24.5

A glance at the above table will serve to clearly indicate the great superiority of the British squadron both in armament and speed. The speeds set down are the designed speeds but reports state that all of the ships engaged had exceeded their designed speed by from one to five knots.

In the accounts of the battle, the great superiority of the British was quickly realized by the German commander, who made every effort to escape the engagement. This move on the part of the German commander was probably called for by the orders under which he was operating, but it must be admitted that no naval commander would willingly have undertaken an action against such great odds. The battle which ensued was a running fight and the British superiority in speed enabled them to rapidly overhaul the Germans. The ill-fated *Bluecher* was the last ship in the German column besides being the slowest of the nine capital ships engaged in the action and it was only natural that the bulk of the British fire should fall upon this ship. The *Bluecher* was the prey of the heavy guns of the British fleet and it was no wonder that a ship of this type should succumb under the volume of fire poured upon her, although it required a torpedo to send her to her final resting place upon the bottom of the sea.

The *Bluecher* was Germany's reply to the first British dreadnought, and as a reply verged on the brink of the ridiculous. The utter unadaptability of this type to successfully cope with the types being constructed by Great Britain was quickly realized by Germany and true battle-cruisers were projected in an effort to keep pace with the British plan of battle-cruiser construction.

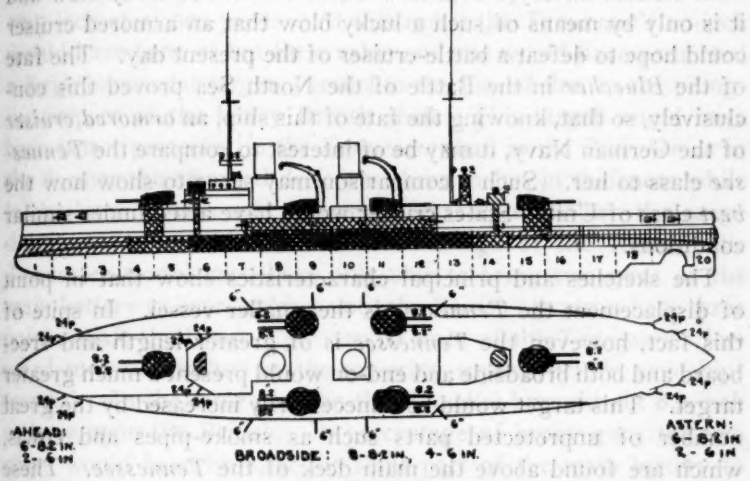
The *Bluecher* is listed in Jane under the caption of armored cruiser and not under the German battle-cruisers. In reality this ship was a transition stage in the change from the armored cruiser of a decade back to the battle-cruiser of the present day. This ship was more than an armored cruiser, in that she carried a greater number of main battery guns, but she was not quite a battle-cruiser because the caliber of the guns was too small to be effective against either present-day battleships or present-day battle-cruisers.

One or two points stand out quite prominently in the accounts of this action. The first and foremost is the unimpeachable proof that the armored cruiser of 10 years ago is utterly incapable of engaging the battle-cruiser of to-day with even the remotest chance of ultimate success. The second point is the great advantage which high speed gives this type of ship in either forcing or escaping an action.

The British speed as a squadron was superior to that of the Germans and this fact alone enabled them to overhaul and sink the *Bluecher*. If the British speed had been less the German squadron would have returned intact to its base and there would have been no action. As it happened, the German speed enabled three of the four ships to reach the safety zone, whereas if their speed had been less they would have been overhauled and it is hard to imagine how they could have escaped a fate similar to that of the *Bluecher* before such an overwhelmingly superior force.

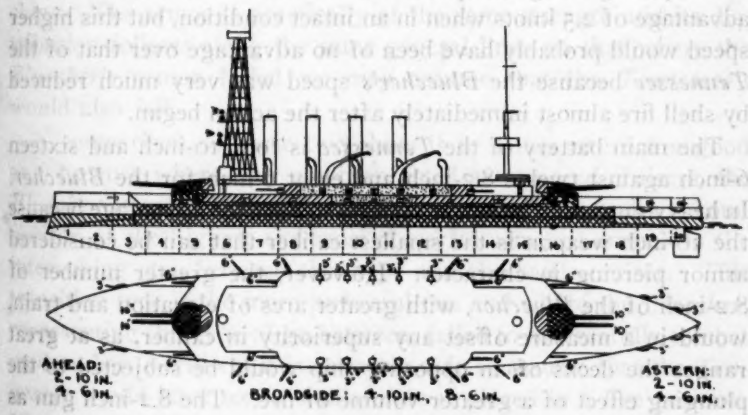
Thus it is seen that in this action speed was of advantage to both victor and vanquished and the results would have been far different if either of the squadrons had had less speed. If the German speed had been less, nothing but a greater German disaster could have resulted, whereas if the British speed had been less, the German squadron would have escaped intact.

To theorize a little while on the subject of speed, suppose that either squadron in this engagement instead of consisting of battle-cruisers had consisted of type battleships. The superior speed of the battle-cruisers would have enabled that squadron to ascertain the strength of the enemy without venturing to within effective battle range. Then, having obtained such information, an action could have been either forced or avoided at the discretion of the commander of the battle-cruiser squadron.



BLUECHER

Principal Characteristics.—Displacement, 15,500 tons; length water line, 489 feet; beam, 80⅓ feet; draft, 27 feet; designed speed, 24.5 knots. Guns: Twelve 8.2-inch; eight 6-inch; sixteen 24-pounders. Armor (Krupp): 6-inch belt, amidships; 4-inch belt, ends; 6-inch turrets.



TENNESSEE

Principal Characteristics.—Displacement, 14,500 tons; length water line, 502 feet; beam, 73 feet; draft, 26½ feet; designed speed, 22 knots. Guns: Four 10-inch; sixteen 6-inch; twenty-three 3-inch 14-pounders. Arcs of train of big guns, 270°. Armor (Krupp): 5-inch to 3-inch belt; 3-inch deck, ends; 9-inch to 5-inch turrets; 5-inch battery; 9-inch conning-tower. Belt 17½ feet wide, uniform thickness, 5 feet below water line; 2½-inch tops to turrets.

In biblical history David slew Goliath with one lucky blow and it is only by means of such a lucky blow that an armored cruiser could hope to defeat a battle-cruiser of the present day. The fate of the *Bluecher* in the Battle of the North Sea proved this conclusively, so that, knowing the fate of this ship, an *armored cruiser* of the German Navy, it may be of interest to compare the *Tennessee* class to her. Such a comparison may serve to show how the *best* class of United States cruiser would have acted under similar conditions.

The sketches and principal characteristics show that in point of displacement the *Tennessee* is the smaller vessel. In spite of this fact, however, the *Tennessee* is of greater length and freeboard and both broadside and end-on would present a much greater target. This target would be unnecessarily increased by the great number of unprotected parts such as smoke-pipes and cowls, which are found above the main deck of the *Tennessee*. These unprotected parts are a great menace to the safety of the ship and the morale of the crew in action, in that they serve to detonate high explosive shell on contact, thus sweeping the decks with splinters.

Comparing designed speeds we find that the *Bluecher* had an advantage of 2.5 knots when in an intact condition, but this higher speed would probably have been of no advantage over that of the *Tennessee* because the *Bluecher's* speed was very much reduced by shell fire almost immediately after the action began.

The main battery of the *Tennessee* is four 10-inch and sixteen 6-inch against twelve 8.2-inch and eight 6-inch for the *Bluecher*. In heavy guns the *Tennessee* appears to have the advantage because the 10-inch weapon is the smallest caliber that can be considered armor piercing in character. However, the greater number of 8.2-inch of the *Bluecher*, with greater arcs of elevation and train, would in a measure offset any superiority in caliber, as at great ranges the decks of an opposing ship would be subjected to the plunging effect of a greater volume of fire. The 8.2-inch gun as installed in German turrets can outrange the 10-inch gun as installed in the turrets of the *Tennessee*.

Disregarding any difference in speed let us consider what might have been the conditions if the *Tennessee* had been the last ship of the German column. As has been stated above, the North Sea engagement was a running fight. The British battle-cruiser

squadron came up from nearly astern and opened fire with their 13.5-inch at 17,000 yards. At this range the *Tennessee's* 10-inch would have been of but little value and she would have presented a large horizontal target, parallel to the line of fire, to the plunging impact of the heavy British shell. This target would have been better protected in the *Tennessee* than in the *Bluecher* as in the former the armored deck was three inches in thickness while in the latter it was only splinter in character. When the range did decrease to within the effective range of the 10-inch, the *Tennessee* would have been only able to bring two guns of the main battery to bear, at least until the British squadron bore three points abaft the beam. The arc of train of the *Tennessee's* forward turret is limited by the towering superstructure amidships to 270°. In the same position the *Bluecher* brought six 8.2-inch to bear upon the British. In percentage of heavy guns the two ships would have brought the same part of the main battery to bear, but in the case of the *Bluecher* the volume of fire would have been greater. The 6-inch battery has been disregarded in this comparison because the *Bluecher's* was practically put out of action before these guns could be used effectively.

In point of side armor there is little to choose between the two ships. The armor is practically of the same strength and its distribution follows along the same general lines, so that where the *Bluecher's* armor failed we may assume that the *Tennessee's* would also fail.

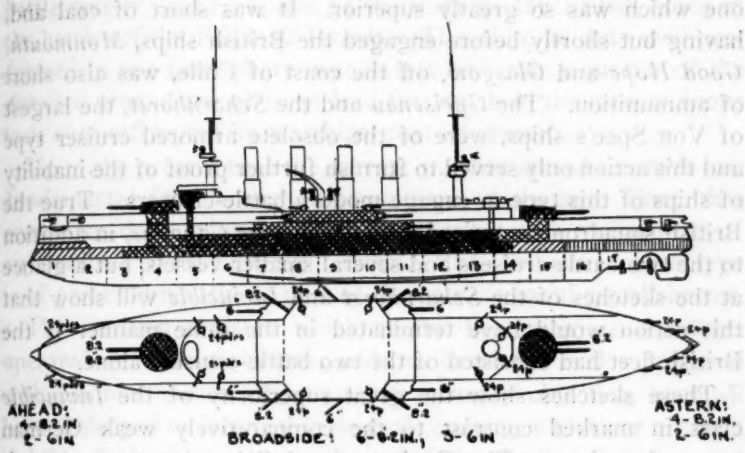
A comparison of these two ships is in a measure not a good one, because where they are both listed as *armored* cruisers, the *Bluecher* is more than an armored cruiser. It is really a comparison of the highest and most powerful armored cruiser to the intervening step between that type and the battle-cruiser. This transition type is the more powerful one and where the *Bluecher,* representing this type of go-between, failed to successfully combat modern battle-cruisers it is certainly safe to assume that the *Tennessee* would have met a similar fate if placed in a like position. Moreover the *Tennessee,* presenting such a large target and being of such slow speed, would have been overhauled and destroyed in much less time than it took for the British to successfully defeat the *Bluecher.*

Turning now to a more detailed consideration of ships for the support of scouts and smaller vessels engaged in blockade duty

and for independent service where considerable fighting power is required, we find that such ships, to be most efficient under the requirements of the service, should be large ones. For most nations such vessels of necessity cannot be battleships. Unless a nation is situated like Great Britain, with a very large fleet of first-line ships at its disposal, it would be bad policy to weaken the strength of the battleship fleet by despatching some of its units on separate service. For this reason and also for the fact that speed greater than battleship speed is required for the proper performance of the duties, battleships should not be made use of. Having eliminated the battleship from the question, the next type in point of power which may be employed is the large cruiser. Large cruisers for these duties need not necessarily be of the battle-cruiser type. The now obsolete type of armored cruiser, if provided with higher speed, is fully capable of performing all the duties incident to this service. A question, and a perfectly proper one, may be asked at this point. Why design and build two different classes or types of large cruiser? Is there any logical reason, if the battle-cruiser is the most efficient type of cruiser for the proper performance of the important military duties relating to fleet tactics, why this type of ship cannot be adapted to perform the duties which should be subordinate to the main duties of the type? The answer to both these questions is the simple statement that the battle-cruiser needs no adaptation for any duty and is the most efficient type for the proper performance of all duties which in time of war fall to the lot of the large cruiser. For independent service, a squadron of battle-cruisers, with its high unit speed and endurance, can perform any duty assigned to it and on the open sea need fear nothing except a superior number of the enemy's battle-cruisers.

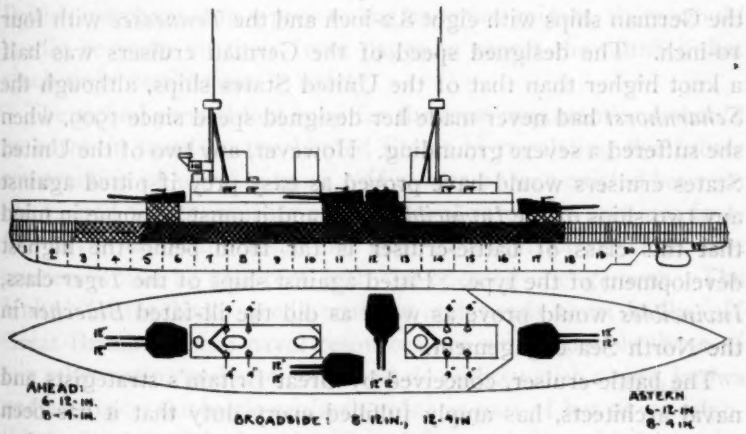
The current war also furnishes us with an example of the use of the battle-cruiser for independent service. Vice Admiral Sturdee's squadron, despatched from England for the express purpose of forcing an action upon the German commerce destroyers in the South Atlantic, included two battle-cruisers, the *Invincible* and *Inflexible*, sister ships of the *Indomitable*, which took part in the Battle of the North Sea.

The action which this squadron was able to force could only have resulted in the way it did. The German squadron was ill prepared for a decisive engagement with an equal force, much less



SCHARNHORST

Principal Characteristics.—Displacement, 11,600 tons; length water line, 449¾ feet; beam, 73 feet; draft, 25 feet; designed speed, 22.5 knots. Guns: Eight 8.2-inch; six 6-inch; twenty 24-pounders. Armor (Krupp): 6-inch belt, amidships; 4¾-inch belt, bow; 4-inch belt, aft; 2-inch armored deck; 6-inch barbettes; 6¾-inch turret hoods; 6-inch battery; 8-inch conning-tower.



INVINCIBLE

Principal Characteristics.—Displacement, 17,250 tons; length water line, 560 feet; beam, 78½ feet; draft, 26 feet; designed speed, 25 knots. Guns: Eight 12-inch; sixteen 4-inch. Armor (Krupp): 7-inch belt, amidships; 4-inch belt, bow; 4-inch belt, aft; 3-inch deck; 10-inch turrets; 10-inch turret bases.

one which was so greatly superior. It was short of coal and, having but shortly before engaged the British ships, *Monmouth, Good Hope* and *Glasgow,* off the coast of Chile, was also short of ammunition. The *Gneisenau* and the *Scharnhorst,* the largest of Von Spee's ships, were of the obsolete armored cruiser type and this action only served to furnish further proof of the inability of ships of this type to engage modern battle-cruisers. True the British squadron comprised a battleship, the *Canopus,* in addition to the two battle-cruisers and several smaller vessels, but a glance at the sketches of the *Scharnhorst* and *Invincible* will show that this action would have terminated in the same manner if the British fleet had consisted of the two battle-cruisers alone.

These sketches show the great superiority of the *Invincible* class in marked contrast to the comparatively weak German armored cruisers. The *Gneisenau* and *Scharnhorst* were excellent examples of the cruiser type of 10 years ago, but they proved themselves no match for the battle-cruisers laid down in England but one year later.

In comparison with the United States cruisers, in point of power these German ships should be placed between the *Maryland* and the *Tennessee* classes. The *Maryland* is armed with four 8-inch, the German ships with eight 8.2-inch and the *Tennessee* with four 10-inch. The designed speed of the German cruisers was half a knot higher than that of the United States ships, although the *Scharnhorst* had never made her designed speed since 1909, when she suffered a severe grounding. However, any two of the United States cruisers would have proved as easy prey if pitted against any two ships of the *Invincible* class, and it must be borne in mind that this class of battle-cruiser is far from being the highest development of the type. Pitted against ships of the *Tiger* class, *Invincibles* would prove as weak as did the ill-fated *Bluecher* in the North Sea engagement.

The battle-cruiser, conceived by Great Britain's strategists and naval architects, has amply fulfilled every duty that it has been called upon to perform in the present European War and has fully justified the expenditures necessary for its development. The confidence of the British Admiralty in the type is well shown by the fact that at the present writing the flagship of the British forces attacking the land defences of the Dardanelles is the

battle-cruiser *Inflexible,* one of the units of the British force in the battle off the Falkland Islands. This ship, its duty well performed in one hemisphere, was despatched over a quarter of the distance around the globe to lead the attack in the most arduous task ever attempted by warships, past or present.

Up to the present time the current war has served to prove two fundamental facts in regard to warfare on the sea: First, that commerce destruction is of but small value as a major item of any nation's naval campaign; second, that the battle-cruiser type is of paramount value as part of the nation's naval establishment.

The German cruisers which at the beginning of hostilities operated on distant stations, with no bases for fuel supply and with commerce destruction as their primary objective, have all been destroyed or interned in neutral countries with their gigantic task hardly begun, and even the submarine warfare being waged upon British shipping has not served to break the backbone of Great Britain's control of the sea. The main German fleet still remains safely bottled up in the Kiel Canal, not daring to venture forth for fear of meeting disaster in the shape of the British Channel fleet and the British flag still flies supreme on every sea. Where American yellow journals, in flaring type, report one British merchant ship a prey to the undersea raiders, there would hardly be room on their front pages to report the number that reach their destinations in safety.

The second proved fact is by far the most important and should be borne in mind by the United States in regulating the future construction of warship types. If a state of war existed between the United States with its present naval resources and any first-line naval nation the value and need of a division of large, fast cruisers would be apparent with the opening engagement. The United States Navy needs cruisers and needs them badly. If Great Britain, whose naval resources are almost double those of any other nation and who could best do without such a type, knows and acts upon the battle-cruiser's value as part of her naval establishment, what right has the United States, a poor third in point of naval strength, to balk at the added expenditure, in reality an economy, that this type would call for? The United States with its vast wealth of natural resources is of necessity a world power and as such *must* keep its place among the world's leading maritime

nations. To retain this position an adequate and first-line navy must be maintained and kept up to the point of maximum efficiency, and by adequate and efficient navy is meant one which includes only the best types of warships for the proper performance of the duties incident to the successful termination of any great naval campaign.

During the Civil War in this country the monitor type was in vogue as the best type of armored ship. This type was manifestly unable to operate upon the open sea and, as the naval establishment of the United States developed, the monitor was soon abandoned, although from time to time sporadic attempts have been made to revive it for coast and harbor defence. This abandonment of the monitor did not mean that the need for armored ships was a thing of the past, but only that the development of warships had reached a point where larger ships, capable of keeping the open sea, were required.

And so it is with the cruiser. The fact that the armored cruiser of 10 years ago has become obsolete and has been abandoned, does not mean that the need for large ships with high speed has passed out of existence. They are needed now as they always will be and the battle-cruiser appears as the *best and only type* of large, high speed ship that should be constructed to fill such need.

Although the United States gave the world the first modern four turret center line installation in the *Michigan* class, it was British strategists and men of science who gave the world the dreadnought type upon which to install it. Great Britain, far from being a military nation, has always maintained the lead in warship construction and the United States, together with the other world powers, has been forced to follow this worthy leader. In battle-cruiser construction, however, the United States has seen fit to stand still where all other nations have advanced. It is not too late for this country to begin the construction of this type which, combining high speed and great fighting capacity, is badly needed and which has now proved its worth in actual battle. We can begin at the point arrived at by Great Britain after almost 10 years of battle-cruiser construction because this type has now proved itself more than an experiment by contributing more than its share in maintaining British control and prestige upon the

open sea. Britannia rules the waves as much at the present time, when a state of war exists, as ever before and she always will as long as her naval expenditures are made in such a manner that only such types of warships are projected as are most suited for the fulfillment of the duties that they will be called upon to perform in time of war.

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THE ARRIVAL OF THE BATTLE-CRUISER

By COMMANDER YATES STIRLING, U. S. Navy

THE BATTLESHIP

"The criterion of warship type will be found in a study of their ultimate service."

The acceptance of this maxim and its application to capital ships has committed the United States to the battleship and to the total exclusion of the battle-cruiser. No fault can be found in the maxim, but, in its application, unfortunately economic considerations have forced the United States Navy to adhere to the pure type in which guns, armor and speed are maintained in proportionate quantities.

"The ultimate test of war is battle. In a fleet action gun power and armor protection are the crowning attributes."

Again the maxim is sound, but have we correctly applied it? History has shown that in all wars one side will take the initiative and act on the offensive, while the other will surrender the initiative and act upon the defensive. The nation acting upon the offensive does so because it feels itself the stronger. Its fleet, by virtue of its superior strength in type, in material and in morale, will attempt to bring the other fleet to action. The other fleet, the defensive one, will await the attack of its enemy within its own waters and probably behind its own fortifications. This is the condition now existing in the great war in Europe. England, with the stronger fleet, has taken the offensive against the weaker German fleet, which lies within the safety of its strongly fortified harbors of Cuxhaven and Kiel.

In the application of these two maxims of "ultimate service," there lies the germ of misunderstanding. The idea that the enemy fleet would immediately operate to bring our fleet to action is in itself sound, but have the methods of accomplishment been correctly determined? Once the idea of a decisive battle is considered, attention at once focuses upon being strong at the point

of attack, and this naturally, if illogically, leads to the decision for battleships, yet in the last analysis the "point of attack," to be strong, requires more than battleships; it requires all types for offence and defence.

THE BATTLE-CRUISER

By virtue of gun power and speed the battle-cruiser is capable of repulsing a supported destroyer attack launched by an enemy upon our main fleet, and supporting a similar attack upon an enemy fleet. These selfsame offensive characteristics give the battle-cruiser the power to drive home a reconnaissance in force upon the enemy's fleet for the purpose of ascertaining numbers and disposition—information eagerly desired by a commander-in-chief in the preparation of his battle plan. Now for the "ultimate service": When the battle-cruiser swings into the battle line it finds itself inferior in armor protection. It is a "thin spot" in the fleet's armored sides.

It is evident that a decision for or against battle-cruisers must be reached after a careful weighing of the relative importance of the offensive service on the one hand and the defensive service on the other. The cost of battleship and battle-cruiser is the same. The United States, basing the decision upon "ultimate service," the defensive one, chose only battleships. Is this decision sound? It may be sound from the standpoint of battle alone, if battle can be considered separate and apart from all the operations leading up to it, but can battle be so considered? The fight in the North Sea recently between battle-cruisers throws grave doubts upon the traditional belief.

COMMERCE A CONTROLLING FACTOR IN WAR

A nation that lives by the sea must be capable of protecting its commerce in all parts of the world. By reason of her instant initiative upon the outbreak of war England has cleared the sea of all German commerce destroyers. The British cruisers are patrolling the trade routes along which the Empire's mighty merchant fleet comes and goes, carrying food and raw stuffs to England and from England the finished products of her great industrial activities, while Germany's commerce has been swept from the seas; her large fleet of merchant ships have either been captured, sunk or lie interned in neutral ports. The Allies have drawn

the net so close that even neutrals, with cargoes of food-stuffs bound to neutral ports bordering on Germany, are held up on the high seas and diverted to ports of the Allies.

For the destruction of the enemy's commerce two types of warships only are needed—the battle-cruiser and the fast scout. The knell of the armored cruiser has been struck in the advent of the battle-cruiser. England is the traditional mistress of the sea. In order to have maintained her supremacy for the last few centuries it was necessary that she be always alive to the requirements of the age and lead in the development of warship types. Carrying out this traditional policy England foresaw the need of a superiority of battle-cruisers and scouts in her fleet.

BATTLE-CRUISERS

ENGLAND

Type	Number	Displacement	Speed	Armament
Queen Mary	4	27,000	32	8 13.5″
Indefatigable	3	19,000	29	8 12″
Inflexible	3	17,000	28.5	8 12″
	10			80 guns

GERMANY

Derfflinger	2	28,000	32	8 12″
Seydlitz	3	24,000	28	10 11″
Von der Tan	1	19,400	28	8 11″
	6			54 guns

SCOUT-CRUISERS

ENGLAND

Tonnage	Number	Speed	Armament
4000–5000	15	25	6″ and 4″
3000–4000	23	25-30	6″ and 4″
2000–3000	8	25	4″

GERMANY

4000–5000	14	27-28	4.1″
3000–4000	13	23-25	4.1″

In the present war England's 10 battle-cruisers have nullified the effectiveness of the six battle-cruisers of Germany. By what seems to us a strategical error in the beginning of the war the German battle-cruiser *Goeben* was forced to seek shelter in

Turkey, thereby reducing the German battle-cruisers available in the North Sea to five.

Germany was influenced by the maxim of "ultimate service."

It is not generally known that in the German Navy there have been two admirals in the confidence of the Emperor with diametrically opposite views upon naval strategical requirements. One of these admirals several years ago went to his Emperor and laid before him a building plan in which no battleships appeared. There were but four types of ships advocated, the battle-cruiser, the scout-cruiser, the destroyer and the submarine. This recommendation was so radical that the Emperor referred it to the head of the Navy Bureau. The result was the retirement from sea service of the admiral who had advocated scrapping the battleship. Germany yet clung to the maxim of "ultimate service."

If, at this time, the German Emperor had taken the advice of this far-seeing naval officer and if, at the beginning of this war, Germany had been able to have in service 12 battle-cruisers instead of six, how would this have influenced the outcome on the sea?

THE BATTLE-CRUISER AND THE SUBMARINE

Before the development of the submarine the battle-cruiser could be blockaded by battleships, or prevented from regaining its fortified base to refuel and refit. The far-reaching effectiveness of the submarine of 20 knots surface speed, which has now appeared, makes this use of the battleship extremely hazardous if not quite impossible.

The submarine can project the fortifications of the base far out to sea. The battle-cruiser reaches the high sea and returns to the base at high speed, guarded, en route, by submarines. Would the enemy endeavor to intercept, even with its superiority in battleships?

The submarine strength of England and Germany is here given:

ENGLAND

Tonnage	Number	Speed		Torpedoes
		Surface	Submerged	
200–300	8	11	7	4
300–400	47	13	9	5
400–600	8	16	10	6
Above 600	18	16	10	8
	81			

GERMANY

Tonnage	Number	Speed		Torpedoes
		Surface	Submerged	
200–300	18	12	8	4
300–500	2	14	8	6
500–800	4	14	9	8
Above 800	12	18	10	8
	36			

THE HISTORICAL LESSON

The fight in the North Sea, where five battle-cruisers of England engaged three battle-cruisers of Germany (for the *Bluecher* was not a battle-cruiser but only an armored cruiser of a more advanced type), is too fresh in the minds of the public to forget that the German sailor knows how to shoot accurately and, furthermore, knows how to use scientifically every type of vessel. It will be remembered that the British battle-cruisers were hard hit and that they turned and sped away when they found they had ventured among waters newly sown with mines and infested with submarines.

If Germany then had 12 battle-cruisers at the beginning of the war, would a different story of the war now be told? Supplied and stocked with fuel and stores for a month, with arrangements for coaling at sea made by that wonderful organization, the German General Staff, so successfully carried out for the squadron of Admiral Von Spee in the Pacific, these 12 battle-cruisers, accompanied by the German scouts, could have left their naval bases and, guarded by submarines through the narrow waters of the North Sea, thereby preventing a concentration of the slow British battleships, could have debouched into the Atlantic and preyed at will upon England's mighty merchant fleet. This fast and powerful force could have brought to action the far-flown but slow cruisers of England that had been left to guard the trade routes. What would have been England's answer? Would she have dispatched her own battle-cruiser squadron of 10 ships to fight the German 12?

This is the naval lesson of the war that the United States should profit by. The dreadnought battleship has passed away. Its

slow speed has made it only a fortification which must of necessity, by its very name, remain on the defensive and at home. The battle-cruiser is the mistress of the sea and he who commands the most powerful fleet of battle-cruisers commands the sea.

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MILITARY EXPLOSIVES

By LIEUTENANT (JUNIOR GRADE) T. S. WILKINSON, U. S. Navy

In connection with the present wide-spread interest in powders and explosives in use in the great war, a few brief and non-technical notes on military explosives may prove timely.

The subject will be considered under the headings of propellent powders, high explosives, and containers.

PROPELLENT POWDERS

Since the last decade of the nineteenth century all the military powers have adopted as propellent powders for all classes of guns smokeless powders of some form or another.

The base of all such smokeless powders is nitrocellulose, which may or may not be compounded, in manufacture, with nitroglycerine. The majority of the powers use a so-called "straight" nitrocellulose powder, containing only nitrocellulose, with its necessary solvent in comparatively small quantities, up to 7 or 8 per cent, and usually a very small chemical constituent known as a stabilizer. The solvent used, while volatile and combustible, is not essentially an explosive substance, and is generally acetone, ether, alcohol, or a combination of any of them. Such powders are used by Germany for her army, France, Russia, Austria, Turkey, and the United States.

The nitroglycerine powders differ in that with the nitrocellulose is admixed nitroglycerine, which acts doubly as a solvent and as an additional explosive substance. Such powders are employed by England under the name of cordite, Italy (ballistite), Japan, and the German Navy. The proportion of nitroglycerine runs from 55-60 per cent in the older British cordites to 25-30 per cent in the later, with ballistite lying between the two, originally near 50 per cent, but now somewhat modified.

The manufacture of both powders is similar up to the point of the admixture of the solvent. Cellulose, in the form of cotton

usually, is thoroughly washed, dried, and nitrated by treatment with a mixture of strong sulphuric and nitric acids; the complex cellulose molecule $(C_6H_{10}O_5)_x$ thereby acquires, by substitution, a number of the NO_2 radicals of the nitric acid and becomes nitrocellulose or guncotton (though the technical "guncotton" is cotton slightly more highly nitrated than that for smokeless powder). After a subsequent thorough series of washings and boilings to remove free acids, the nitrocellulose is ready for the solvent. For the straight powder the solvent is mechanically mixed with the nitrocellulose; the stabilizer, such as diphenylamine or amyl alcohol, being in solution in the solvent, and the whole, now a gelatinous mass, is pressed in dies, under strong pressure, into a continuous rope, which is then cut into grains of proper length. The diameter, length, and perforations of the grains vary for different calibers and according to the practice of the country. Powder for guns is made in cylindrical perforated grains; for small arms in small flat flakes. After the graining of the powder it is dried out, in drying chambers and drying houses, until the percentage of volatiles (or remaining solvent) is reduced to the desired; this process is tedious and delays greatly the delivery of the powder. For the nitroglycerine powder, the nitrocellulose is mixed directly with the nitroglycerine and then "grained" similarly as above. The process must be very carefully executed, owing to the extreme sensitiveness of the nitroglycerine. The grains, for both great guns and small arms, are in the form of cords (hence "cordite") and vary in diameters according to the size of gun for which intended and are cut in length to suit the length of the powder charge or section of charge in which they are to be made up. A less lengthy period of drying is necessary for this powder.

Both powders give progressive burning, with a continuous impulse, in properly designed powders, behind the shell until its expulsion from the gun at a high initial velocity, without at any time undue pressure in the gun. The chief difference in the ballistic properties of the two powders lies in the higher temperature and chamber pressure of the cordites of a large proportion of nitroglycerine. To this is ascribed, by some authorities, the greater erosion caused by such powder, but it is now claimed that the erosion caused by the recent low-percentage-of-nitroglycerine cordites is no greater than with nitrocellulose powder. The controversy between the advocates of the two types is by no means

ended, as will be seen by the adherents among the nations to each type. When carefully made, both give regular and uniform ballistic results, the costs differ little, and the advantage in weight of charge possessed by the earlier cordites is lessened in the later. The two terrific explosions in the French Navy, the *Jéna* and the *Liberté*, have cast a doubt upon the stability of the nitrocellulose type, but cordite explosions have also been known, and the introduction of the stabilizer—a substance designed to counteract the first stages of decomposition—and periodical reworking of the powder have almost removed the danger of spontaneous combustion of the nitrocellulose type in properly cooled magazines. The tendency of the nitroglycerine in the cordite to freeze and to sweat has been decried. Neither type will stand a continued heat of over 100° F. in magazines for a length of time, and the old cry of "Trust in God and keep your powder dry" has been changed to "—— and keep your powder cool."

HIGH EXPLOSIVES

Just as the development of smokeless powder has led to one substance, nitrocellulose, with or without nitroglycerine, for the base of all, so military high explosives, under whatever name of "D," lyddite, melinite, shimose, T. N. T., etc., may all be traced, with the single exception of guncotton, to one source, the derivatives of the hydrocarbons of the aromatic or benzene series. These hydrocarbons have hitherto only been obtained commercially from coal tar, the distillation product of the manufacture of coke from coal, but now the discoveries of Dr. Rittman, of the U. S. Bureau of Mines, promise us an adequate supply, both for the explosive and for the aniline dye industries, obtained directly from crude petroleum.

Unlike the progressive burning of propellent powders, a high explosive must be capable of instant and complete detonation, with resultant great bursting pressure, and yet, for shell charges, must be insensitive to the shock of being fired from a gun. For mine and torpedo charges, insensitiveness, though desirable, need not be so high. The search for such a substance has resulted in the almost universal adoption of picric acid, $C_6H_2OH(NO_2)_3$. This is the trinitration product made by treating phenol (monohydroxy-benzene), known to the layman as carbolic acid, with concentrated nitric acid. It is a yellowish, bitter-smelling and

acrid-tasting crystalline powder, insensitive to shock, burns freely on application of a flame, but detonates instantaneously under the blow of a proper "detonator," such as mercury fulminate. It is chemically quite stable, and will not deteriorate, but forms sensitive salts, "picrates," with most metals; hence it must be prevented from attacking the walls of the shell cavity by lacquering them. On detonation, the substance is instantaneously, not progressively as in propellent powders, changed into its constituent, or rather resultant, gaseous products, mostly oxides of carbon and nitrogen, pure nitrogen, and water vapor, with very high temperature evolved. The confinement of the quantity of gas at a high heat produces an immense bursting force within the shell.

Of the various powers, France uses almost pure picric acid under the name of melinite; the Germans use it, as also its related T. N. T. (which see below); the Japanese shimose is picric acid; the English lyddite nearly pure picric acid, having a small percentage of dinitrobenzene and vaseline.

A second important but perhaps less widely used high explosive is tri-nitrotoluene, or T. N. T. This is the tri-nitrated product of toluene, methyl-benzene ($CH_3C_6H_5$), and bears the formula $CH_3C_6H_2(NO_2)_3$, and is made by the action of fuming and concentrated nitric acid on toluene. It is being much used in Germany for mines and torpedoes, possibly for shells also, and has been advocated for adoption by the United States. It is understood also that the British and Italians are adopting it. Like picric acid, it is a crystalline powder, nearly white (in commercial quality; dead white when pure), insensitive except to proper detonators. It is chemically very stable, does not form, in contact with metals, sensitive compounds, and possesses the mechanical advantage that it may be melted and poured into a mold, as for shell fillers, torpedo charges, mine charges, etc., thus doing away with the laborious and somewhat dangerous packing and tamping by hand necessary for picric acid charges. Its detonation products are of the same nature as those of picric acid.

Chemically closely akin to picric acid is tri-nitro-cresol, the "cresylite" of the French and the base of the Austrian "ecrasite." It is simply picric acid, in which one of the H atoms has been replaced by the radical CH_3, giving $CH_3C_6HOH(NO_2)_3$, so that the product is comparatively more rich in carbon and hydrogen and less rich in oxygen percentage than picric acid. It has much

the same characteristics. It is little used, even in France and Austria.

Totally different, however, from these aromatic hydrocarbon explosives is guncotton, used largely everywhere, except in Germany, for mine and torpedo charges. This is made as described for nitrocellulose for smokeless powder, but with slightly stronger treatment by the reacting acids, with resultant higher nitration. It is then formed into cakes and blocks suitable for loading into torpedo war-heads and mine cases. The bulk of such charges is wet guncotton—guncotton saturated with water to 25 per cent (approximately, differing for various countries) of the total resultant weight—and only a small priming charge of dry guncotton is carried. The wet has the advantages of great insensitiveness to shock, being detonated only by the detonation of dry guncotton, and of good chemical stability, as long as its water content is not allowed to evaporate. The dry, however, is liable to deterioration and is very sensitive to shock; defects which, since the dry guncotton must be carried as a detonating charge, militate against the advantages of the wet.

Nor must be forgotten the father of all explosives, black powder. Originally used primarily as a propellent powder, it is now used only as a bursting charge, and that only in shrapnel and in small caliber shells; for these purposes it is used by all nations. It is a mechanical mixture (while all other explosives heretofore mentioned are chemical compounds) of carbon (as charcoal), sulphur, and potassium nitrate, made in varying proportions in different countries, but in the general approximate ratio of 15 per cent C, 10 per cent S, 75 per cent KNO_3. This powder is incapable, under ordinary circumstances, of instantaneous detonation, but when confined in a small space burns or explodes so rapidly that a bursting effect is produced almost as great as that of a detonation. The decomposition products are oxides of carbon, nitrogen, and potassium sulphide, a solid. This too-rapid burning, with great heat and pressure, and the presence of a solid residue, were, as well as the smoke (mostly caused by the solid), reasons for the abandonment of black powder in favor of, as a propellant, "smokeless" powder. Black powder needs no special detonator, any flame-producing fuse igniting it, and is chemically stable, except that it loses much of its power when damp or wet. It is interesting to note that its smoke of explosion is white, and that of the high

explosives on detonation is black, so that the white puffs of smoke described in accounts of present-day battles may all be ascribed to black-powder shells, usually shrapnel, while the black puffs or clouds show the larger shells charged with high explosives.

Mention has been made of the detonation of these high explosives. Detonation, as opposed to burning, a progressive conflagration, is the complete instantaneous transformation of the entire mass of the explosive into its resultant explosion-products, all gaseous in a well-chosen explosive. If the explosive is sufficiently insensitive to resist the shock of firing, naturally the hardly greater shock of striking will be insufficient to cause detonation. Consequently, the detonation is accomplished by means of a small quantity of some other explosive, contained in the fuse of the shell, or in the "exploder" or "detonator" of the mine or torpedo. This substance is generally mercury fulminate, a very powerful but expensive and sensitive explosive—hence not suitable for the bulk of the charge—secured in the fuse so that not until impact will it be exploded. It is a gray crystalline powder, of formula $Hg(OCN)_2$, made by the action of concentrated nitric acid on metallic mercury in the presence of alcohol. For large explosive charges, however, a heavy impulse or shock is necessary to detonate, requiring a dangerous amount of fulminate; this is avoided by the use of a "booster" charge, contained in the fuse, of picric acid, T. N. T., or some other such material, which is detonated by the fulminate and, by its own detonations, in turn detonates the main charge. For wet guncotton charges, the booster, in this case known as a primer, is dry guncotton. Another detonating substance, less sensitive than mercury fulminate, and as powerful, is lead trinitride, $Pb(N_3)_2$, but to the present it has been adopted, it is believed, by but one country, Brazil.

NOTE.—An idea of the terrific effect of the instantaneous detonation of a high explosive may be shown by a brief, rough calculation. Assume an explosive carge of 48 lbs. of picric acid, such as might easily be carried in a thin-walled shell, with shell cavity volume about 2/3 cubic feet, from the 11-inch German siege howitzer. This is entirely converted into gas according to the approximate equation (owing to internal reactions and the phenomenon of "disassociation" the exact equation will differ, but this reaction as given will err rather on the side of too little than of too great a volume of the resultant gases),

$$C_6H_2OH\ (NO_2)_3 = 4\ CO_2 + CO + H_2O + N_2 + HCN,$$

giving eight volumes of gas. For eight cubic feet of such gases, at 0° C. and atmospheric pressure, the weight would be .64047 lbs.; but since all

the explosive is converted into gas, there are 48 lbs. of gas, or the total volume is

$$\frac{48}{.54047} \times 8 = 600 \text{ cu. ft. (about)}.$$

That is, if unconfined at normal temperature and pressure, the volume would be 600 cu. ft. But this volume is confined in a space of about 2/3 cu. ft. in the shell cavity, and also it is subjected to the extremely high temperature caused by the chemical action of detonation. This temperature has been estimated at nearly 4000° C. Then to find the pressure in the shell by Charles' law,

$$PVT' = P'V'T, \text{ or}$$

$$14.7 \times 600 \times 4273 = P' \times \tfrac{2}{3} \times 273, \text{ or}$$

atmos. pres. × normal vol. × abs. temp. of explosion, equals pressure of explosion × volume of shell × normal (0° C.) temp.

$$\text{Then } P' = \frac{14.7 \times 600 \times 4273 \times 3}{2 \times 273}$$

$$= 202{,}270 \text{ lbs. per square inch}$$

$$= 100 + \text{short tons per square inch},$$

showing the tremendous disruptive pressure within the shell at the moment of detonation.

CONTAINERS

It is hardly the province of this brief description to go deeply into the subject of containers, but the principal types, such as shells, torpedoes, mines, and bombs, will be noted in respect to their explosive content and its arrangement. (For propellent powders, of course, the container is the gun, of which no description is necessary.)

Shells are of three general types, armor-piercing, common, and shrapnel. The armor-piercing, used by all navies and in siege gun operations against armored forts, are special steel, thoroughly heat-treated to hardness and toughness, thick-walled and contain a small cavity and necessarily small charge of high explosive, detonated generally by a delayed action fuse, to allow passage through armor before detonation. Common shell, in use mainly in land operations against field works and troops, are ordinary steel, thin-walled, non-heat-treated (to any extent), containing a larger quantity of high explosive, detonated immediately upon impact by the fuse. Shrapnel are very thin-walled shell, containing a number of spherical balls of about .3 to .5 inch in diameter, with a small bursting charge either of high explosive or of black powder, and fitted with a fuse to explode the shell either on impact or after a certain time of flight determined by the artillerist's setting of the

fuse before the shell is fired from the gun. Except for the black powder in shrapnel, the explosive used in shells is some form, as noted above, of the hydrocarbon high explosives. The weight of the explosive content varies, of course, with the caliber and type of the shell.

Torpedoes carry a large charge in the thin steel war-head, the forward compartment of the torpedo. This charge is immediately on impact exploded by an "exploder" or "detonator," carried in the extreme nose. The explosive in general use is wet guncotton, although Germany uses T. N. T. The normal explosive content of a torpedo is 200-250 lbs., but it is rumored that the German torpedo for submarine boats carries a charge of as much as 400 lbs.

Marine mines are thin steel cases, generally spherical, almost entirely filled with high explosive, either wet guncotton or T. N. T. They are exploded either by action of a percussion plunger on a fulminate exploder (a type now almost obsolete), or by the firing of a fulminate detonator by the completion of an electric current; this last effected either by the impact of a vessel, or by closing a key in an observation station. The explosive content of a large mine may run to 500 pounds, of the smaller as low as 200. Little has been made public of the nature of the land mines used in this war. It is probable, however, that they are chambers dug out of the earth, and filled with explosive, either packed directly into the chamber, or preferably in light metal cases. The explosive may be either black powder or high explosive, probably the former, as it is cheaper and nearly as efficient for the purpose; the ignition may be accomplished either by a slow-match fuse, or by closing an electric circuit from a distance.

Bombs are similar to mines in that they are thin-steel cases, spherical or pear-shaped, packed with high explosive, the exact nature of which is not known, but is probably in each case the hydrocarbon explosive favored by the country making and employing the bomb; and fitted with a fuse to detonate the contents on impact. Hand-grenades are similar, though sometimes of cylindrical shape. The explosive content varies, of course, with the size of the bomb, which may be of the small type provided for aeroplanes, carrying 5-35 lbs. of explosive, to the air-ship bombs containing as much as 200 lbs. Hand-grenades carry about 2-3 lbs. of explosive.

U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

THE REFLOATING OF THE R. N. *SAN GIORGIO*

(November 21-December 10, 1913)

EXTRACTS FROM THE REPORT OF CONTRAMMIRAGLIO UMBERTO CAGNI

Translated by LIEUT. COMDR. RICHARD DRACE WHITE, U. S. Navy
Late Naval Attaché, American Embassy, Rome

TRANSLATOR'S NOTE.—The real cause of the *San Giorgio's* grounding has never been made entirely clear. The night was clear, the sea was calm, the locality was well-known and two light-houses were in sight, although one light was said to have been burning dim.

The *San Giorgio* had left Reggio, Calabria, somewhat before 6 p. m. She was standing north through the straits of Messina, running a speed trial and allowing the engine room force to work up the speed as steam came. There first occurred a "mix up" with two steamers bound south. The *San Giorgio* was compelled to sheer out to port, after some confusion, in each case. A search was then made for *Punta Pezzo light,* and it appears that *Punta Peloro light* was mistaken for it. The bearing *A-A* (See Fig. 1) was apparently plotted through *Punta Pezzo* fixing the ship at the point *B* whereas she was in reality at *A*. This assumption appeared reasonable since the speed was estimated at 13 knots whereas the ship was really making 16. The ship grounded a few minutes after this bearing was plotted.

This accident came as a hard blow to the Italian Navy. It was the second time this splendid ship had grounded under apparently inexcusable circumstances. There were on board and on the bridge at this latter time two officers of splendid attainments—Admiral Cagni and Captain Cacace were perhaps the best known and most beloved and highly respected of all the officers in the Italian Navy.

In the legal proceedings consequent to this accident, Admiral Cagni was exonerated of all blame, and although relieved temporarily from his command, he was subsequently restored to it. Captain Cacace was suspended for six months, and the navigator imprisoned for a term. The last two officers were assessed the cost of repairs.

This account seems of peculiar interest in that it shows the perseverance, cleverness and attention to detail with which the Italians attack their problems.

On November 21, at 6.25 p. m., the *San Giorgio* grounded without shock near the shore at a point between the hamlet of Sant'

Agata and the Contrada Principe, and immediately heeled 4 degrees to starboard.

The large boats were immediately hoisted out and an anchor was carried out from the starboard quarter to the eastward, to hold the ship fair with the current.

FIG. 1

Fires were lighted in the boilers in the two after boiler rooms, third and fourth.

The boilers in the forward boiler rooms, first and second, had been under steam, but the water had rapidly invaded the first compartment, and the personnel, after having isolated the boilers and released the pressure, had been forced to withdraw; closing all the water-tight doors after them.

The water, in addition to entering the forward boiler rooms invaded the 190-mm. magazine, the 254--mm. magazine, the 254-mm. handling room, the 76-mm. magazine, as well as the adjacent spaces, namely, from frame *16 AV* to frame *50 AV*. It also threatened to invade the upper spaces. The flooding of these localities, however, succeeded very slowly and the crew were able to make an attempt to get going the means for pumping out each locality. This work was forestalled, however, by the impossibility of opening the valves of the manifold connecting with the suction to the sounding wells, which manifold for the wells forward of frame *30 AV* are situated in the forward boiler room.

However, the slowness of the flooding, which, in the locality comprised between frames *30 AV* and *50 AV* was arrested at the second hatch, and the fact that the ship in grounding had received only a light shock indicated that the hull had not received any grave injury.

From a preliminary round of soundings it was found that the ship was held on a shelf sloping off from port to starboard and from the bow toward the center, with the bow in 4.59 meters of water.

The idea of freeing the ship and floating her in the flooded condition was soon abandoned, but I hoped to release her before she should get tighter aground by reason of her own weight, and to move her astern, say 20 meters, so as to let her rest in deeper water and thus render less difficult the subsequent labor of refloatation when all or the major part of the water should be pumped out.

The strong current, the rising sea, and the favorable inclination of the bottom made this hope not unjustifiable.

With this in view, I vainly tried to haul her towards the after anchor, having put into action all the means of pumping out the flooded compartments and backing full speed with both engines, first separately, then together.

Meanwhile steel hawsers were got on deck and ready, and at 9 o'clock the first line was given to the steamer *Roma,* which arrived very quickly with the second-in-command of the *San Giorgio* on board. This steamer, of 4000 horsepower, was admirably handled by her captain, who, in spite of the difficult current which runs in the locality of the grounding, succeeded very shortly in taking up the tow.

NOVEMBER 22D, 1913

While we waited for high water, which the light-house keeper informed us would occur about 2.30 a. m., provision was made with all the means at hand to impede further flooding of compartments by infiltration, shoring up the second hatch between frames *30 AV* and *50 AV*.

At 2.35 the *Roma* went ahead full speed and the *San Giorgio*, as soon as the tow straightened out, backed water, backed full speed, first with the port engine, then with the starboard, and then with both together. This attempt proved fruitless and the *Roma* was ordered to veer a bit of chain and then at our signal to go ahead at full power: the *San Giorgio* aided this force with her engines backing full speed (70 turns, about 5000 H. P.). But this also proved fruitless and the two steel hawsers, one of 16 mm. and the other of 14 mm., carried away simultaneously.

The *Roma* should have left at midnight for Naples: I let her go.

From a visit made soon after the grounding by Captain Cacace, who knew perfectly and in the most minute particulars the interior of the ship, it was ascertained that:

(1) The water had completely flooded compartments Nos. 90 (forward boiler room), 89, 91, 92, 93, 94, 96 (adjacent bunkers), 88 (190-mm. magazine), 82, 83 (254-mm. magazine), 77 (76-mm. magazine).

(2) That water was rapidly flooding compartments Nos. 84, 86, 87 (torpedo store rooms), 81, 85 (tiller room) 78, 79, 80 (carpenter's shop).

(3) Water was flooding by infiltration the torpedo launching room (170), the surrounding compartments (168, 169, 171, 172), and the flanking refrigerating compartments (161, 162, 163, 164, 165, 166 and 167) as well as the central station and the passageways.

The captain ascertained also from the differences in level of the water inside that the major number of the above named compartments were flooded by infiltration due to imperfect closings, or imperfect holding of water tight bulkheads or doors, through transmission passages, or through voice tubes which last let in water everywhere in small but uninterrupted streams.

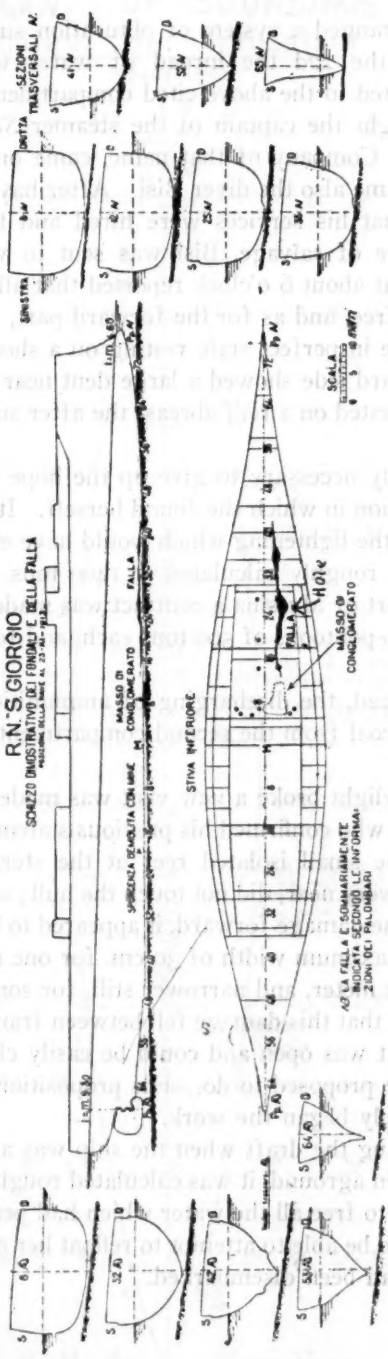

FIG. 2.—The hole is roughly indicated according to information furnished by the divers.

He rapidly arranged a system of obturation such that by the early hours of the 22d the inroad of water was completely stopped and limited to the above cited compartments.

During the night the captain of the steamer *Salvator,* of the German Salvage Company of that name, came on board and at 4 o'clock there came also the diver Bisi. After having been given to understand that his services were hired and that they were not in the nature of salvage, Bisi was sent to visit the under water body and at about 6 o'clock reported that all the after part of the ship was free, and as for the forward part, whilst the port side seemed to be in perfect state resting on a shoal of sand and grass, the starboard side showed a large dent near frames *32 AV* and *36 AV* and rested on a reef abreast the after smokepipes near frame *22 AD*.

It was evidently necessary to give up the hope of moving the ship in the condition in which she found herself. It was therefore decided to begin the lightening which would have eventually to be done, which was roughly calculated at 1400 tons. Through the captain of the Port of Messina a contract was made for two pairs of shears and two pontoons of 500 tons each, and four of 100 tons and 50 tons.

At dawn, the 22d, the discharging of ammunition, light guns, anchors, chains, coal from the second compartment, and naphtha, began.

As soon as daylight broke a new visit was made to the bottom by the diver Bisi, who confirmed his previous statement, reporting, however, that the small isolated reef at the stern, near frame *22 AD,* although very near, did not touch the hull; and that having better observed the damage forward, it appeared to be a horizontal rupture with a maximum width of 30 cm. for one meter's length, 5 cm. for another meter, and narrower still, for somewhere about 2 meters further; that this damage fell between frames *23 AV* and *28 AV* and that it was open and could be easily closed from the outside, which he proposed to do. His proposition was accepted and he immediately began the work.

Now, considering the draft when the ship was at Reggio compared to that when aground, it was calculated roughly that, granting we were able to free all the water which had penetrated to the interior, we would be able to attempt to refloat her only after 1470 tons of weight had been disembarked.

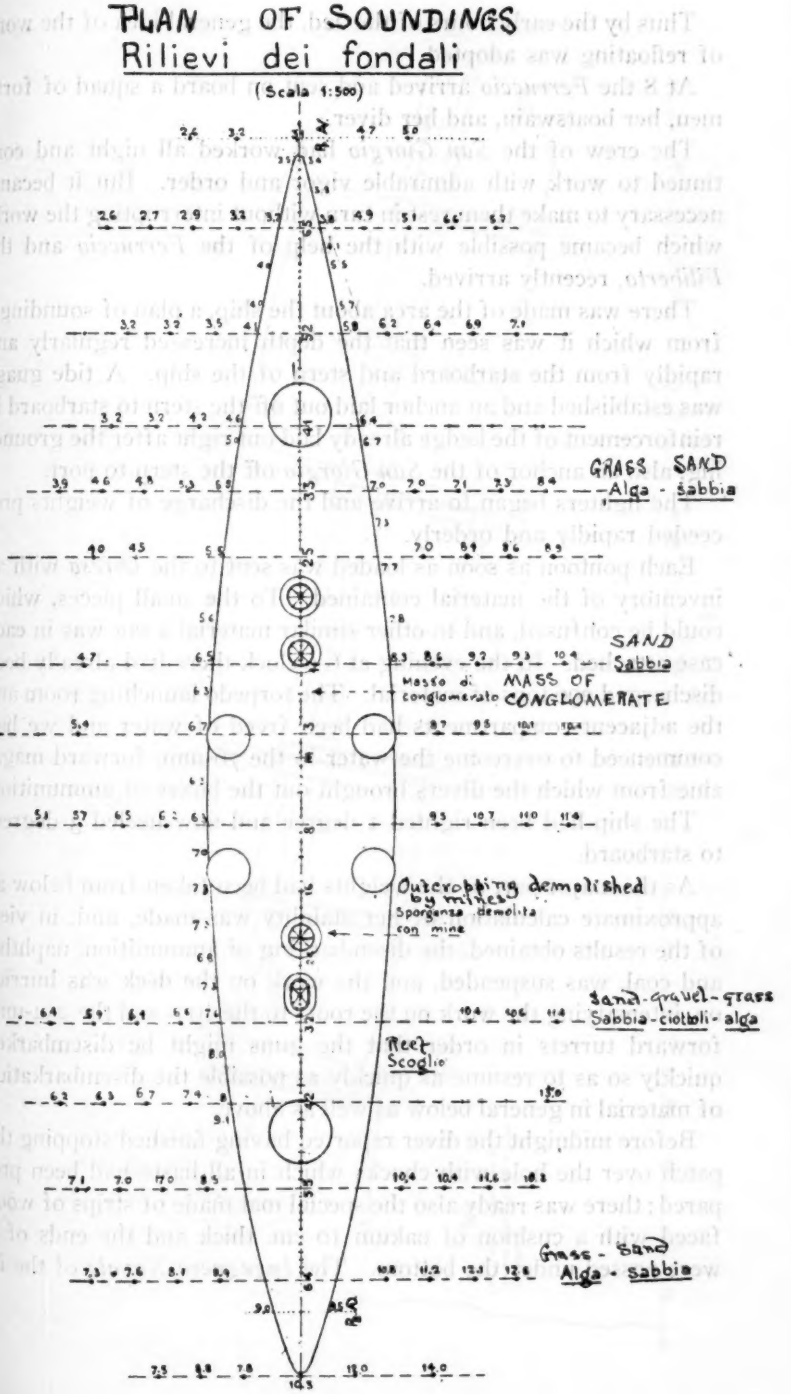
PLAN OF SOUNDINGS
Rilievi dei fondali
(Scala 1:500)
GRASS SAND
Alga - sabbia
SAND
Sabbia
Masso di conglomerato
MASS OF CONGLOMERATE
Outcropping demolished by mines
Sporgenza demolita con mine
Sand-gravel-grass
Sabbia-ciottoli-alga
Reef
Scoglio
Grass - Sand
Alga - sabbia

FIG. 3

Thus by the early hours of the 22d, the general idea of the work of refloating was adopted.

At 8 the *Ferruccio* arrived and sent on board a squad of forty men, her boatswain, and her diver.

The crew of the *San Giorgio* had worked all night and continued to work with admirable vigor and order. But it became necessary to make them rest in turn without interrupting the work, which became possible with the help of the *Ferruccio* and the *Filiberto,* recently arrived.

There was made of the area about the ship, a plan of soundings, from which it was seen that the depth increased regularly and rapidly from the starboard and stern of the ship. A tide guage was established and an anchor laid out off the stern to starboard in reinforcement of the kedge already laid out right after the grounding, also an anchor of the *San Giorgio* off the stern to port.

The lighters began to arrive and the discharge of weights proceeded rapidly and orderly.

Each pontoon as soon as loaded was sent to the *Difesa* with an inventory of the material contained. To the small pieces, which could be confused, and to other similar material a tag was in each case attached. In the evening at 6 o'clock there had already been discharged 290 tons of material. The torpedo launching room and the adjacent compartments had been freed of water and we had commenced to overcome the water in the 76-mm. forward magazine from which the divers brought out the boxes of ammunition.

The ship had been righted 1 degree and now heeled 3 degrees to starboard.

As the major part of the weights had been taken from below an approximate calculation of her stability was made, and, in view of the results obtained, the disembarking of ammunition, naphtha, and coal, was suspended, and the work on the deck was hurried on, intensifying the work on the roofs to the 190- and the 254-mm. forward turrets in order that the guns might be disembarked quickly so as to resume as quickly as possible the disembarkation of material in general below as well as above.

Before midnight the diver reported having finished stopping the patch over the hole with chocks which in all haste had been prepared; there was ready also the special mat made of strips of wood faced with a cushion of oakum 10 cm. thick and the ends of it were passed under the bottom. The *Ingegnere Navale* of the *V.*

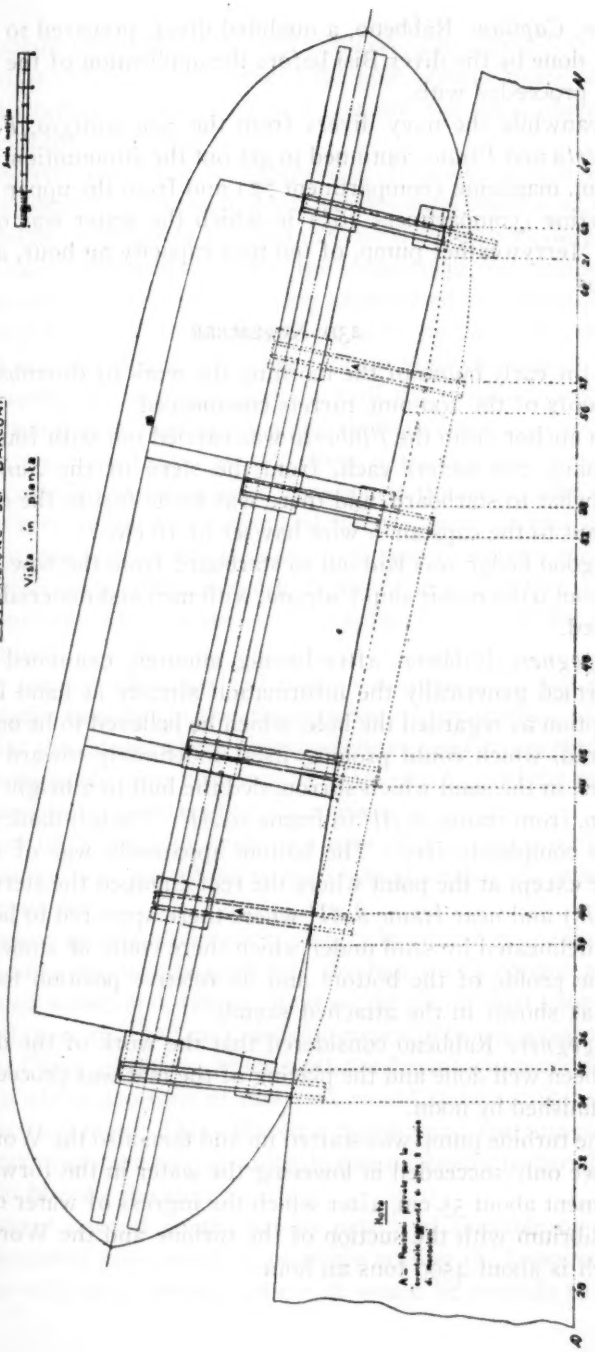
R. NAVE "SAN GIORGIO"
SISTEMAZIONE DEI BARCONI
Vista in pianta
Nota

FIG. 4

Pisani, Capitano Rabbeno, a qualified diver, prepared to visit the work done by the diver Bisi before the application of the mat was to be proceeded with.

Meanwhile the navy divers from the *San Giorgio, Ferruccio, Filiberto* and *Pisani* continued to get out the ammunition from the 76-mm. magazine (compartment 77) and from the upper 254-mm. magazine (compartment 165) in which the water was overcome by a Merryweather pump, of ten tons capacity an hour, and hand pumps.

23D NOVEMBER

In the early hours of the morning the work of disembarking of the roofs of the 190-mm. turrets commenced.

An anchor from the *Filiberto* was carried out with four lengths of chain, 200 meters each, from the stern of the *San Giorgio* somewhat to starboard, and there was made fast to the chain and led taut to the capstan, a wire hawser of 16 cm.

A good kedge was laid out to starboard from the bow.

About 9 the repair ship *Vulcano,* with men and material for help, arrived.

Ingegnere Rabbeno, after having minutely examined the hull, confirmed generically the information already at hand but made exception as regarded the hole, which he believed to be only partly covered, which could prolong itself indefinitely toward the bow hidden in the sand which surrounded the hull to a height of about 20 cm. from frame *28 AV* to frame *56 AV*. The left flank appeared to be completely free. The bottom apparently was of sand and stone except at the point where the reef engaged the stern (frame *22 AD*) and near frame *8 AV* where there appeared to be a hump well delineated by sand under which there could be stone.

The profile of the bottom and its relative position to the hull was as shown in the attached sketch.

Ingegnere Rabbeno considered that the work of the diver Bisi had been well done and the placing of the mat was proceeded with and finished by noon.

The turbine pump was started up and then also the Worthington but we only succeeded in lowering the water in the forward compartment about 55 cm. after which the ingress of water came into equilibrium with the suction of the turbine and the Worthington, which is about 4500 tons an hour.

This failure of the diver did not dishearten us in the least, but convinced us of the prolongation of the hole beyond frame *28 AV* and we therefore decided to try to dig out the sand along the bottom with the navy divers.

The *Società Salvataggi e Ricuperi di Messina,* to whom the diver Bisi belonged, offered to excavate this sand rapidly with the special turbine which they had installed on the steamer *Audax*. I accepted their offer and next day the experiment was made. In the meantime in the morning, having ascertained the impossibility of carrying the stern to starboard so as to liberate the reef on *22 AD,* it was decided to blow the reef up with dynamite. This had apparently already damaged the hull for it was found that the fresh water contained in the double bottom above it (compartment 38) was salted, and in any event it represented a serious danger in case bad weather gave a motion to the ship. The operation was very delicate on account of the proximity of reef to the hull, but it was indispensable; and there was therefore engaged another diver, expert in this work, a Swede in the service of the *Società Salvator* who commenced immediately to drill the holes for the mine.

During the day there arrived thirty workmen from the Armstrong Works to assist in the dismounting of the turrets. There arrived also the *Ercole* with a hoisting lighter and two *corpi morti,* and there commenced to flow rapidly from the Arsenal the means of work and salvage ordered by the minister.

The work of discharging continued with alacrity and at 6 o'clock in the evening there was found to have been disembarked over 400 tons of material.

Considering the condition of the ship as indicated by the numerical data collected, it appeared that she had taken aboard about 1600 tons of water, and, taking count of the diminished buoyancy of the hull there resulted an initial difference between weight and buoyancy of over 2800 tons, which, with the disembarkation already effected of about 400 tons of material, would reduce it to a little more than 2400 tons. This difference represented reaction of the bottom and approximately speaking it was necessary to annul this reaction to liberate the ship.

It appeared beyond doubt that by means of portable or temporarily installed pumps and by patiently sealing the bases of the bulkheads with rapid setting cement, it would be possible to free

and keep dry those compartments flooded by simple infiltration. On the contrary for the compartments flooded by direct ruptures, one could not have the same certainty, since it was very probable that the holes were not completely accessible to the divers, being in part imbedded in the sand.

The idea then was to discharge or support the vessel in such a way as to keep it down by the stern as much as possible, since the immersion of the stern, by rotation about the point of rest forward, would bring about a diminution of thrust of the hull forward notable enough. Practically speaking, admitting the worst hypothesis, viz., that there would remain in the end 1200 tons of water inside the ship, it was not possible to realize this condition by the disembarkation of weights alone, since the point of rotation was very far forward; but it was useful to keep in mind the ulterior and notable diminution in thrust of the hull which would result, either from the intensified disembarkation of weights near the bow to the exclusion of those near the stern, the providing of an abundance of external means of flotation, or the placing of these means as near the bow as possible. The preparation and expedition of two couples of compressed air cylinders of 350 tons each was being prosecuted, and the captain of the Port of Messina placed, at my disposition, pontoons and lighters together with the cylinders sufficient to produce the desired external lifting force.

The condition of the ship, so far as regards stability, remained good. This would also be true even if the ship were to be considered in the most unfavorable of the hypothesis, *i. e.,* to be on hard and incompressible bottom. The reaction of the bottom against the keel produced a light heeling moment easily noticed, on account of which the ship tended to fall to one side, preferably to starboard; but found, after a few degrees, a position of equilibrium and a moment of stability which rapidly increased with each additional amount of heel. It seemed prudent altogether to persevere in the plan already adopted and give precedence to the disembarkation of high weights, accompanying it gradually by the disembarkation of the weights low down, and to maintain the ship as nearly upright as possible. I arranged in the engine room space two long pendulums (4 meters) to indicate any inclination, whether longitudinal or transversal.

The pumping operations made it necessary to keep open many means of communication for the passage of tubes, conduits, etc.

I arranged to proceed as rapidly as possible with a distribution of temporary pumps with fixed piping, in such a way that each transversal zone of the ship would have at least two suction pumps of its own; and arranging to maintain closed, at least, the communications between the above mentioned zones and to give to each independence from the others.

I arranged to install in the torpedo launching room a pumping central, this being particularly adapted to the purpose by its freedom from obstruction. This room is on the deck which covers the two largest magazines flooded, and is in the heart of the zone subject to inundation, the limits comprised in the bunkers and boiler rooms flooded. By arranging the pumps on this deck they would be able to work at a limited suction height, and therefore in the most efficacious mode.

I requested therefore from the ministry the dispatch of pumps; I procured a list of pumps which the various local companies had available and took inventory of their state of efficiency.

A heavy anchor with eight lengths of chain was laid out from the stern at a small angle.

During the night we succeeded in emptying compartments Nos. 79 and 86, which had been flooded by the giving way of the bulkheads in the transmission passageways, and we succeeded in conquering also the water in compartments 77 and 87.

These results gave great encouragement to the men who for two days, guided by *Capitano Macchinisto* Capitanio and *Ingegnere* Rotundi, had lived in water to the waist in the bottom of the hold, in the hardest kind of work, battling against a continual flow of rivulets which taken altogether were a great menace of serious flooding.

24TH NOVEMBER

In the early hours of the morning the last 190-mm. gun was hoisted out. A start was made on the roof of the forward 254-mm. turret which had to be lifted in sections. This proved very ticklish work for the two fitted pontoons had no boom of sufficient length to take the plate from the center line of the ship, and it was therefore necessary to work with two false tackles while the pontoons had a sensible movement from the sea.

The ship had already come up one degree and now heeled only two degrees to starboard. She also moved slowly.

The *Società Salvataggi e Ricuperi* put to work their sand sucker only to find out its impotence, whether this was due to difficulties of bottom or position as the company claimed or to imperfections in the material, I do not know. They gave up their work, which was thereupon undertaken by the navy divers, and the company and the diver Bisi were dismissed. A squad of seven good divers arrived from our school and with them *Tenenete di Vascello* Vivaldi Pasqua, an excellent licensed diver.

All the after part of the hull of the ship was free up to near frame *89 AV*, except for the isolated reef near *22 AD*, which was to be demolished; but in this zone it was not desirable to apply external lifting force for the reasons already given; in fact they would have done more harm than good. From frame *8 AV* to near frame *12 AV* the keel was fast to the ground. Going towards the bow from frame *12 AV* to frame *27 AV* there was a space about 14 meters long free by reason of the bottom falling away, which permitted the passage under the keel of steel slings necessary to secure a pair of cylinders to the ship. From frame *27 AV* to near *64 AV* there was a zone of more than 30 meters where the keel was fast to the ground forbidding the passage of slings under the keel by any means. Furthermore, the limited depth of water at this point made it impossible to submerge completely the large cylinders (5 meters in diameter) and hence made it impossible to take advantage of the full lifting power of the cylinders in case of need. Similarly a zone from near frame *64 AV* to the ram was free, but there the falling away of the hull of the ship prevented any slings which should be placed there from holding, and the limits of depth forbade the employment of compressed air cylinders.

Considering the necessary balance of moments, the two cylinders applied in the free zone, frame *12 AV* to *27 AV*, were not of themselves sufficient to free the ship because they would be too far abaft the point of rotation of the keel on the bottom. It was therefore necessary to apply forward of the cylinders, that is, under the forward part of the ship, a pair of pontoons or lighters.

In view of complex considerations I decided to adopt as external means of buoyancy forward a couple of cylinders secured with steel wire slings passed under the keel in the free zone, and forward of these a couple of big lighters or pontoons yoked to the

ship by means of large brackets or buffers keyed to the ship's side near the bow.

This pair of lighters or pontoons, which would work at a considerable distance from the midship section, up under the bow, should give the necessary and sufficient upward thrust for floating off and a large reserve of stability for further eventualities; the pair of cylinders which had been placed somewhat abaft the localities flooded by direct holes would be put into use more or less according to the quantity of water that remained on board at the time of refloating.

I ascertained the principal features of one of the large 500 ton lighters which was then alongside, and sent *Ingegnere* Monticilli to select the best of the large floats which the captain of the port put at our disposal. I requested the expedition from the Royal Ship Yard, at Castellamare, of the 12 large iron brackets which had already previously served in refloating the ship.

Ingegnere Monticilli reported that the best floats were three large wooden coal barges (of which one was already alongside) of 500 tons capacity each.

In this manner, having at our disposal three barges and four cylinders, and actually putting into operation two barges and two cylinders, there resulted ample provision for any eventuality.

To hurry along the drilling for the mine to blow up the after reef, and for the work on the brackets the use of the compressors on board the *Vulcano* seemed very desirable. This ship therefore came and moored astern of the *San Giorgio,* but towards evening when the air pipes had just been run out, the turning tide which took against her port side became so strong that the *Vulcano* was driven sideways causing her to plough against two anchors; the position of that ship became dangerous for herself and the *San Giorgio* as well and it became necessary to slip her moorings and give up the use of her compressors.

During the ebb tide there ran near our stern a violent set off shore almost perpendicular to the shore line, while forward the current was much less strong and followed the direction of the beach. At such times along the starboard side from the gangway to the bow the current followed the side of the ship while from the gangway to the stern to starboard and to port, a direction much inclined, almost perpendicular to the side, and from the port gangway to the bow the water was more or less still. This whirl-

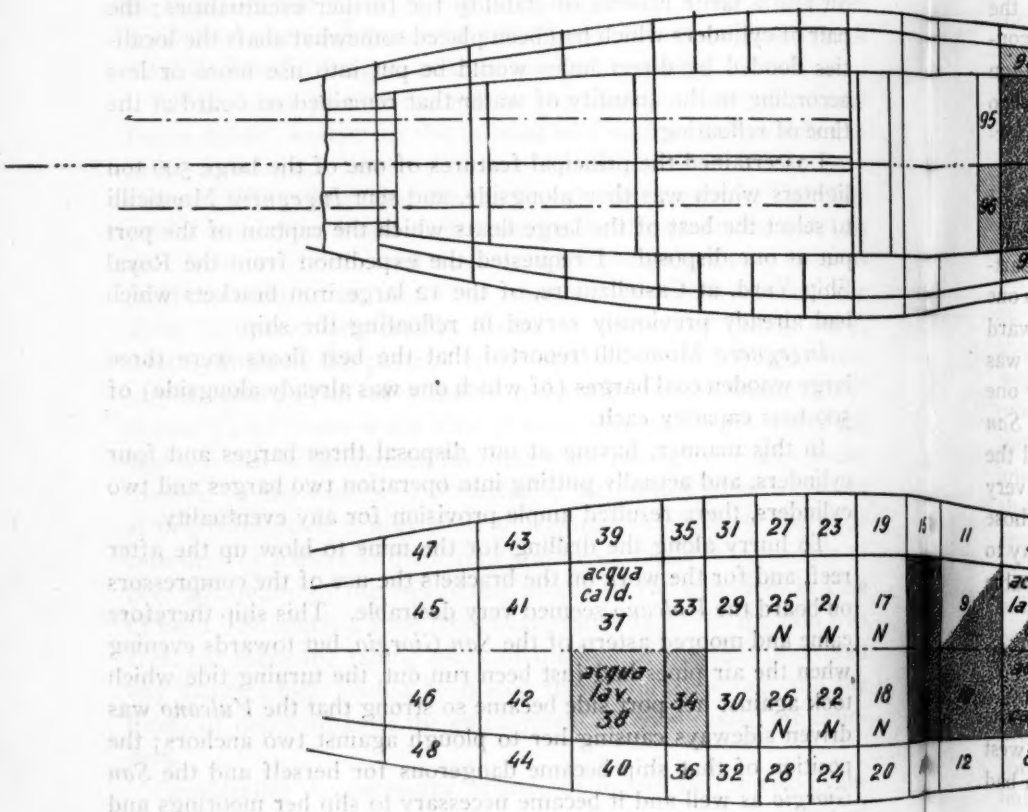
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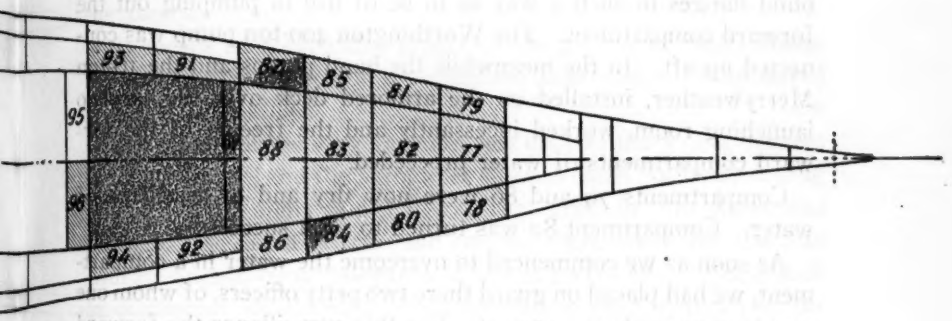
FIG. 5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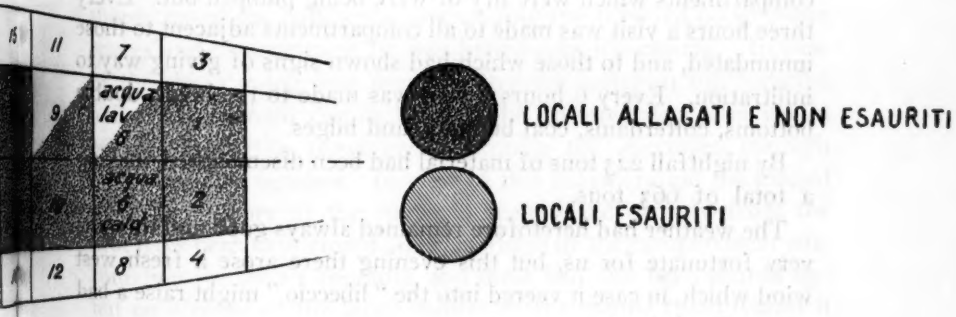
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pool effect made it very dangerous to approach our stern, from either side of which the lines to the anchors ran.

A 200-ton Worthington pump was rented and installed in the torpedo launching room in order to secure a good pumping efficiency. In the meantime the firemain was being hitched up with blind flanges in such a way as to be of use in pumping out the forward compartment. The Worthington 400-ton pump was connected up aft. In the meanwhile the hand pumps and the 10-ton Merryweather, installed on the armored deck over the torpedo launching room, worked incessantly and the freeing of the forward compartments of water proceeded.

Compartments 79 and 86 were now dry and 87 was free of water. Compartment 82 was turned to with success.

As soon as we commenced to overcome the water in a compartment, we had placed on guard there two petty officers, of whom one was to remain always present. For this surveillance the forward part of the ship was divided into 3 zones. The extreme bow was entrusted to 8 petty officers from the *Ferruccio,* the next after one to 8 from the *Filiberti,* and the after part to 10 from the *San Giorgio.* Every hour the captain or his representative visited the compartments which were dry or were being pumped out. Every three hours a visit was made to all compartments adjacent to those innundated, and to those which had shown signs of giving way to infiltration. Every 6 hours a visit was made to the holds, double bottoms, cofferdams, coal bunkers, and bilges.

By nightfall 223 tons of material had been disembarked, making a total of 663 tons.

The weather had heretofore remained always good and this was very fortunate for us, but this evening there arose a fresh west wind which, in case it veered into the "libeccio" might raise a bad sea at Sant' Agata.

The sea going tug *Titano* arrived.

An electrical 20-ton pump from the *Vulcano* was added to those already in use. The water in compartment 81 was overcome and that compartment dried out. From compartment 77 we commenced to take out 76-mm. ammunition without the aid of divers, and the water was lowered in compartments 80, 82, 83, and 85. It began to be clear that we should be able to completely free all the spaces forward of frame *30 AV.*

An attempt was made to pump with the outfit of the *Ercole* but the tortuous lead of the suction hose and the depth of same rendered practically vain this attempt or at any rate incommensurate with the great interference which the presence of this large tug caused in the disembarkation of heavier weights and the work of the sheers.

By means of a cartridge a part of the after reef (near frame *22 AD*) was blown up and the complete destruction of it appeared to be surely possible.

The wind became very variable, but held within 3 or 4 degrees of the quadrant, and the barometer showed small but lively falling off. The local pilots said that with the "libeccio" the water was likely to rise about 60 cm. and 60 cm. represented for the *San Giorgio* an additional buoyancy of about 1000 tons. In case such an occurrence should come about, or with an even smaller rise, the ship might make an unforeseen movement and in such a case it would have been a grave mistake not to profit by it. The four moorings astern were therefore reinforced with wire, as well as those on the starboard quarter and all the doors in the passageways and the battery were hermetically sealed. There were closed and shored up all the bulkheads surrounding the forward boiler room spaces and compartment 88 was kept ready for closing. In case of the ship's going into deeper water the water in the forward boiler room would rise as high as the armored deck and would overflow into the passageway through the apertures through which pass the uptakes. In view of this consideration the hinged watertight doors of the fireroom trunks had already from the first days been kept closed; that, is, those of the compartment surrounding the smoke conduits, and these had also been shored up; but on account of the large volume of the engine room trunks it was decided to close directly the apertures above the armored deck. With this in view, a force of boilermakers, under the direction of *Ingegnere* Monticelli, had already rapidly knocked down the uptakes between the armored and battery decks, numbering the pieces, while a gang of carpenters, using a double layer of heavy wood with felt in between, built over the four openings in the armored deck a robust watertight trunk, solidly shored up from top to bottom. This work, which was pushed ahead and finished, insured us against a dangerous entrance of water which would

leave her to sink considerably by the head had she unexpectedly floated off in this condition.

The engines were warmed up and fires were lighted in all the after boilers and left to be ready on half an hour's warning.

Two navy divers went down into the forward boiler room and closed tight the openings from the bunkers after having freed the guides of coal. They had orders to try to open the valves of the forward main drain but this they were unable to do.

We began to come up the nuts and studs of the forward side armor where it was arranged to make fast the 12 brackets already requested, which had served before, by bolting them to the side; they were due to arrive soon from Castellammare.

The question of placing these brackets with reference to the floats which we were to employ was now taken up. These floats were very broad and on account of their disposition it was necessary to prolong the arms of the brackets from 4.50 meters to 6.50 in order that the point of pressure would plumb the midship line of the lighters, and avoid serious heeling of the floats when in use. Besides, the brackets when previously employed were applied to the central part of the ship whereas now they would have to be applied at the extreme bow. *Ingegnere* De Vito worked up the scheme for making the necessary modifications and had made the various drawings; the work consisted of applying to the lower face of the brackets iron beams curved and molded according to the difference of profile between that necessary and that existing. Each bracket was able to resist a force of 80-tons applied near the extremity of the arm for which, to care for all the thrust the lighters were capable of, (about 500 tons), six brackets for each side would be necessary. But since the work of modifying these brackets was slow and tedious and since it was shown by calculation that it would be sufficient for each one to exert about 250 or 300 tons of pressure it was decided that, while proceeding with the preparation of all the six couples, precedence was to be given to the first four, putting them in position and putting the floats into use as soon as they were done. Only in case some eventuality should require the employment of a superior force, or one near the maximum available, would the others be applied.

By nightfall there had been disembarked 106 tons of material and there had been pumped out 200 tons of water. The ship had

already come up one degree. The weather remained variable but the west wind had shifted.

26TH NOVEMBER

During the night compartments 80 and 82 were pumped out and the ceiling of compartments 83 and 85 was uncovered. The drying out as far as bulkhead *35 AV* was then assumed.

The navy diver De Francisco discovered the leak in compartment 77. The flooding kingston had forced and cracked the covering in the fork of a star.

The steamer *Augusto* brought a squad of 90 workmen from the Arsenal to reinforce the 30 arrived the 23d, besides the 30 from the Armstrong Co. Twenty-eight workmen also arrived from Castellammare coming by rail.

After sundown the *Dandolo* arrived towing the 150-ton floating crane.

Another part of the reef under *22 AD* was blown up and although a point still remained in contact with the ship's bottom it was much cracked. The explosion of the other mine during the night was delayed since double bottom No. 34 adjacent to No. 38, the fresh water in which had already been found to have salted, gave signs of considerable infiltration while double bottom 38 was found to be under pressure.

The heads of two rivets were found near the reef, which explained what had happened and the next day work was begun to stop the leaks using wooden plugs.

Signor Vivaldi confirmed the existence under the keel of a free space for about 14 meters between frames *10 AV* and *26 AV* for the passage of the 4 slings for the cylinders, and a space further aft at *5 AV* for the passage of the 5th sling. He also ascertained that the accumulation that had formed on the bottom under the first strakes opposite frames *8 AV* to *12 AV* was a hard and fragile conglomerate covered with sand and that this did not touch the hull but was clear of it by about 10 cm.

By evening 60 tons of material and 100 tons of water had been discharged. All the bolts of the 190 casemates and those of the forward 254 casemates had been come up.

27TH NOVEMBER

During the night the last forward 254-mm. magazine, compartment 83, was dried out and in the morning the adjacent, 85, was finished.

The navy diver had placed internally and shored up over the hole in compartment 88 the iron box made for that purpose on the *Vulcano*. The *Titano* was moored along the port side as her pumping float was situated lower than that of the *Ercole* and therefore gave a more efficient suction. With the *Titano's* pump, which handled in the operation about 200 tons, and the Worthington, installed in the torpedo launching room, good for more than 200 tons, we commenced to pump on compartment 88 and lowered the water rapidly. The men could already work in the magazine and went ahead getting the ammunition out from there. At a certain point the outer pressure carried away the felt that was placed between the leak-stopping caisson and the hatch. It was necessary to let the compartment refill, and re-do the work, substituting for the felt a large layer of rubber.

During the night a large 150-ton crane had been rigged. Before noon time the pontoon had been towed alongside and the work of disembarking the 190-mm. casemate was begun; the two forward 254-mm. guns were also disembarked.

During the day a good part of the armor that was loose had been hoisted out while inside the work of cutting rivet heads and bolts continued.

As a result of observations made by Lieutenant Vivaldi, and in view of the unfortunate outcome of our attempt to pump out the forward boiler room, it was decided to remove the mat of the *Ditta Salvataggi e Recuperi*, and attempt the obturation of the hole with our navy divers. Some good submarine lamps had arrived from Spezia and with these the work could be carried on at night.

The after reef to starboard near *22 AD* which was smashed the day before was found to have been carried away by the current and now the after part of the ship was completely free from any danger.

The Swedish diver closed with strips of lead the crack in the plating, and stopped with wooden plugs the holes left by the two rivets that had been dislodged. Double bottom 38 was then easily emptied and 34 dried out.

Double bottom 34 was cemented from the inside where the outer plating joined it.

This work finished, I decided to discharge the Swedish diver and Salvator, good as they were, who, because they belonged to a foreign company, provoked a quantity of insistent and continuous criticism from the *Società Nazionale*. The public began to make of it a question of sentiment, against which it was not worth while to fight from the moment we were able to take care of every eventuality with our navy divers.

The ship was now on an even keel and had become very sensitive to the movement of weights. She had a light rolling movement, and also moved somewhat in the longitudinal sense.

By evening 120 tons of material had been disembarked making altogether 919 tons, exclusive of the water taken from inside, in the neighborhood of 300 tons.

28TH NOVEMBER

During the early hours of the morning it rained excessively but the work was not slackened on that account.

During the night compartment 84 was emptied and the work of stopping the hole in the 190-mm. magazine from the inside was finished. During the day the ammunition from this magazine was discharged and the level of water inside was lowered to within a few centimeters of the mat. The work of stopping the small infiltrations and of shoring up the large box-shaped leak stopper was proceeded with and from now on the problem of this compartment may have been considered solved.

Forward of frame *30 AV* all the compartments above the bilges were dry except for certain minor infiltrations which little by little were being stopped.

There was a false alarm in a coal bunker, from which at the fifth plate there was an unexpected burst of water. This was caused by the rupture of a voice tube which communicated with the forward boiler room. The damage and danger were quickly taken care of.

Two 190-mm. casemates, and what had remained of the forward 254-mm. barbette were disembarked. The latter had presented grave difficulties during the unbolting which we had begun before the arrival of 150-ton crane, because it would have been impossible to lift the entire casemate with the two hired cranes

which had only short booms and limited capacity (about 30 and 60 tons).

There was beginning to be felt the deficiency in transporting lighters which, on account of the lack of hoisting gear, could not be entirely discharged on shore. I sent the 60-ton floating crane to the *Difesa* and with this means the commandant, working night and day, returned to us regularly our unloaded lighters.

The divers who worked on the hole outside informed me that the ship now rested on a heap of conglomerate in the region of frames *5 AV* and *8 AV* and in fact on one of the periodical visits to the double bottoms it was found that the double bottom to starboard under the fourth bulkhead, second compartment, was under pressure. This was caused by a slight but noticeable settling of the bow. Therefore I decided to lighten the stern immediately disembarking the 254-mm. guns.

In a few hours the roof of the turret was come up and thanks to the 150-ton crane, the disembarkation of these guns was accomplished that same night. The stern came up about 20 cm. and the hull came free from the mass of conglomerate.

By night 140 tons of material had been disembarked making a total of 1059 tons.

In the afternoon the rain stopped and good weather came again with a breeze from the northwest.

29TH NOVEMBER

Compartment 88 was now completely dry and the work of calking several leaks around rivets which held the ammunition racks was progressing.

Ingegnere Rotundi, with the workmen from the *Vulcano* and those from the Naples Arsenal, finished the installation of the pumping central in torpedo launching room.

This central was composed of an electric centrifugal 300-ton pump (of the new *Duilio*) more specially arranged with a view of taking care of underlying 190-mm. magazine should the leaks at any time reopen; a Worthington steam piston pump of 200 tons capacity especially arranged with a view to taking care of any invasion of water into the 254-mm. magazine; 3 smaller pumps of about 10 tons capacity each (two electrical centrifugal and one steam piston type) arranged with a view to keeping dry the torpedo launching room in case of need.

There was installed below, in the underlying 190-mm. space, an electrical centrifugal pump of 100 tons capacity, which could work intermittently, if necessary, to take care of water coming by infiltration. In the same compartment there was also arranged a suction for the 400-ton Worthington permanently installed on board.

In this manner for all the zone as far as frame *40 AV*, means were amply provided for taking care of any water which in any event should come in by infiltration.

All the piping for water and steam passed through the bulkheads in watertight flanges; in the course of this work, near every hole which was made in a bulkhead there was prepared and kept ready a corresponding leak stopper.

The forward well at frame *45 AV* was now dry.

The fresh water tanks, which practically fill the entire space between frames *50 AV* and *56 AV*, were pumped out and hermetically sealed.

Arrangements were started with a view to converting the electrical distribution pumps into exhausting pumps, to provide against any eventual, however improbable, flooding of the space between the hatches.

We laid out from the stern, always slewed a little to starboard, a third 6-ton anchor backed up by a 2-ton one with 8 lengths of chain, the end of which was hove taut and secured on board.

Two 24 H. P. winches in the after deck house were arranged to haul on the chains.

The standing parts of the tackles were secured to the ports of the two central bunkers and the running parts led to the forward capstans.

A beginning was made on the disembarkation of the forward armor to port with the small sheers, while the 150 ton crane worked on the starboard side in spite of the sea.

In the meantime request had been made, several days previously, for leak stoppers of dimensions adequate for covering the air ports. They arrived with the usual promptness. It was impossible, however, to apply these stoppers because they adhered badly on account of the marked curvature of the ship's side where the ports were situated. A remedy was found in forcing small mats soaked in oil and tallow between the air ports and the side.

The divers had worked almost all the night and continuously throughout the day. They assured themselves to-day that the hull did not touch from aft to frame *40 AV*, although between frames *30 AV* and *40 AV* it was free only by a few centimeters.

The ship now had a movement in roll more pronounced than on the preceding days: she was maintained without constant heel by filling of the lateral double bottoms. By night 309 tons of material had been disembarked making a total of 1368, not counting about 100 tons of water. The westerly wind continued.

30TH NOVEMBER

Thoroughly assured of the water tightness of the compartments forward of bulkhead *30 AV*, a second attempt was made during the night to overcome the water in bunkers 91 and 93, and the efforts this time were successful, thanks to the closure of the lower doors effected by the divers.

The work of getting the coal out of these bunkers was proceeded with immediately—a tedious work since it was necessary to hoist the coal by a bucket through a single scuttle, the other scuttle being encumbered with pumping gear.

The wet coal had then to be carried aft over the transverse armor and dumped into the empty bunker of the 3d and 4th boiler compartment in order that it might be used up quickly and thus escape spontaneous combustion.

The bow had settled a little more, altogether about 20-cm. since the day of grounding. The stern had come up about 50 cm. consequently, although it left the ship in better condition, the hull had lost buoyancy (about 300 tons) which would be difficult to restore owing to the position of the mass of conglomerate near frame *8 AV*.

To offset in some measure, the emergence of the poop, I had placed in the tiller room and in the extreme after 76-mm. magazine the heaviest gear of gunner and torpedo gunner which was stowed forward and which could not conveniently be disembarked.

The *Ercole* arrived towing 2 cylinders. I sent her into port as the securing of the slings was difficult here in the open sea.

By night 110 tons of material had been disembarked making a total of 1478 tons.

1ST DECEMBER

During the night bunker 93 was practically emptied and 91 was one-third finished which contained somewhat over 24 tons of coal.

The arrangement of temporary pumps, in addition to those of the central, for pumping out the various transversal zones forward of frame *44 AV* was completed. The installation consisted of one 100-ton electrical centrifugal pump to draw from the 254-mm. handling room, and one 40-ton piston steam pump taken from one of the evaporators on board and arranged to draw from the 76-mm. magazine.

As I have above noted, of the two electrical piston 10-ton pumps used for fresh water service, one was arranged for suction on the above mentioned magazine, and the other on the capstan compartment. A number of hand pumps were placed in the passageway.

We had thus 10 pumps including those of the "central" with a total capacity of 1500 tons, besides the 4 centrifugal pumps in the engine room, capacity 4000 tons and the bilge pumps of the engines.

The hole had now been completely obturated with plugs, outside of which were applied 3 regulation leak stopping mats. The divers required all day to complete this work so it was necessary to pump at night.

With the big turbines and the auxiliaries of the *Titano* we succeeded in lowering the water in the boiler compartment 60 cm. and then the suction force came into equilibrium with the external pressure.

We had now disembarked other armor plates, port after 190-mm. casemate, and the forward 254-mm. handling room gear.

We were obliged to cut some nuts and several bolts which did not give way to the oxo-hydrogen flame. In spite of the longitudinal transfer of the weights the stern continued to rise as a result of the general lightening of the ship and she could be felt working in the sand at the bow.

The after lines were hauled taut at low water and the apertures in the passageways and the outboard battery forward were maintained constantly closed or ready to be closed, and the boilers were primed and kept ready; with a view to profit by any occasion favorable to refloating, but it was decided not to attempt the

same unless there were good chances of success, or unless the conditions became threatening to the safety of the ship. By night 124 tons of material had been disembarked, making a total of 1602 tons exclusive of 500 tons of water.

2D DECEMBER

During the night bunker 93 was pumped out and shored up from the lower water tight door leading to the boiler room, over this door a false door of wood was applied from the inside and well shored up and sealed.

A hole was bored between 91 and 93 and another between this and the bunker immediately aft which would discharge the water coming from 91 into the second boiler compartment, where it could be pumped out by the engine bilge pumps. With this system of drainage the water also in 93 could be pumped out without the need of pumping it from the passageway and the extraction of coal became less slow.

The pontoon fitted with compressors was secured alongside to port.

The ship was heeled 2 degrees to port so as to undertake the stoppage of the hole in the bottom, thus permitting the divers to work better. They hoped to complete the obturation of the hole which extended beyond frame *30 AV*, and to work there had to commence by digging a hole in the sand beneath it. We had not heretofore had great faith in these results nor to free in any way the forward boiler compartment; but we had already got rid of a greater quantity of water than we had expected.

Already we had pumped out bunker 94 and were prepared to work also at bunker 92.

It was decided not to touch transversal bunker, No. 89, which being full of coal presented a resisting section between the forward boiler room and the spaces toward the bow, which spaces were now completely dry. The unfilled space in this bunker was filled with cork well compressed to diminish the amount of water that could come in when the bow went further down.

On shore the work of fitting the slings to one cylinder was finished and the work on the second commenced.

The first two brackets were brought on board, and the other two were promised successively at 40 hour intervals, so that by

Saturday it was hoped to have the 4th; which would in 40 hours more be in place. This made it desirable then that the lighters be ready by the 9th or 10th inst.

The preparation of these lighters had already been begun. It consisted in laying along the top a robust arming of two longitudinal stringers resting on the beams designed to support the wedge shaped blocks which would be placed under the brackets; these stringers were reinforced under the beams by vertical shores resting on the keelson and by oblique props or braces disposed either in the longitudinal or transversal plane, so that each bracket would direct its force on the top of a framework pyramid which would distribute the force over an extensive transversal zone of the pontoon structure. On account of lack of time the idea of decking over the pontoons with wood so as to be water tight was given up, although such was the well advised wish of the engineers; but temporary partitions, not water tight, both longitudinal and vertical, about a couple of meters in height, were fitted in the inside of the lighters to cut up the space occupied by the water ballast, to check its tendency to rush back and forth in case of bad weather which would threaten the pontoon's stability.

Already all the heavy plates had been removed and I sent into port the 150-ton crane which would be very useful in discharging the lighters.

By evening 20 tons of material had been disembarked and 50 tons of water pumped out. The weather was good but the barometer gave warning of losing its steady line.

3D DECEMBER

The work of discharging the coal from bunker 93 was now entirely done. In the evening the work of extracting the coal from 92 was begun, in which locality we attempted to lower the level of water and maintain it low. Whenever a suction stopped up a bit the water rose and the men had to run for the small hole in the armored deck.

The first two brackets were now in place and the work of securing them was undertaken. They weighed over 4 tons each, and when completely in place with the internal cushion of leather, the plating counter weight, and the keys, each bracket represented a weight of about 5 tons. The brackets were 8 in number and

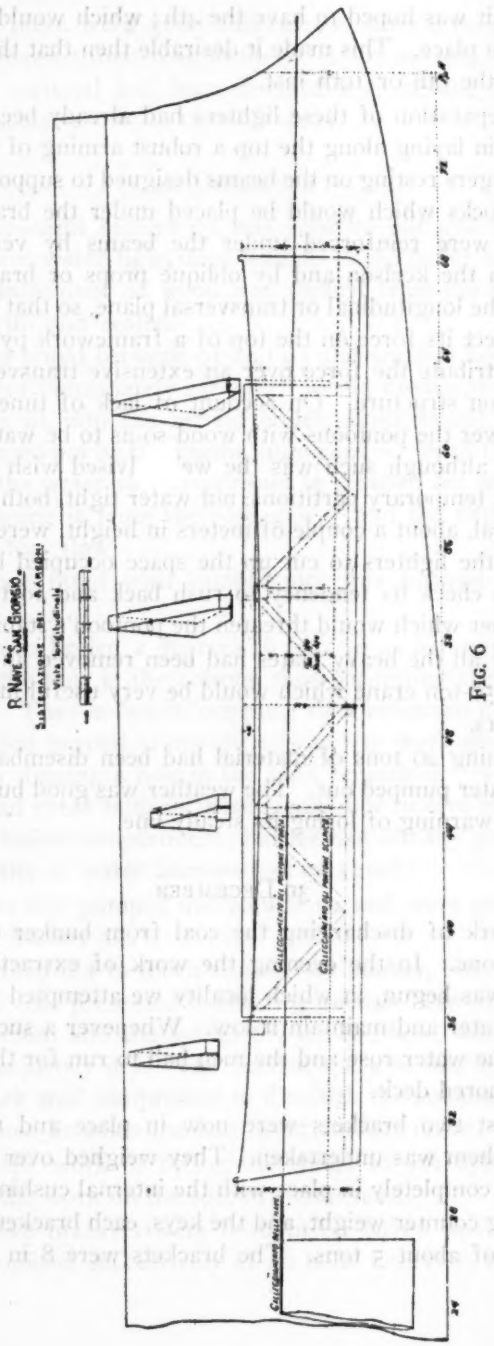


FIG. 6

made a total weight of 40 tons placed at the extreme bow. We could counteract this by carrying aft all the bags and hammocks, also getting aft all the crew at the moment of refloating; but considering the fact that we had given up the hope of pumping the 440 tons of water out of the forward boiler compartment, I decided to employ the cylinders, and to proceed with placing them as soon as they were ready; for in case we succeeded in pumping said compartment, we could easily rid ourselves of them.

The ship moved very freely about its support forward, which seemed to be restricted to the space between frames *42 AV* and *56 AV*—that is to say a space of about 13 meters—and the water did not rise and fall about the stern with the change in height of the sea with the tide.

Fifty tons of material were disembarked. Taking a complete inventory of the weights disembarked thus far, and taking count of the daily coal consumption, we concluded that 1750 tons had been disembarked and 80 tons of material taken on board.

4TH DECEMBER

While the work of clearing out bunker 92 was going on with many interruptions, bunker 94, which had coal in it, was also emptied and it was pumped out with the bilge pumps through the 2d boiler compartment. Towards evening we succeeded in sealing it water tight.

The divers had finished their work as far forward as they could go. They were certain they had passed beyond frame *30 AV* and hoped for success in the attempt at pumping which was made in the afternoon. The attempt, however, did not succeed. The water fell rapidly enough to the usual 55 or 60 cm., and then came into equilibrium with the outside and rose again even with the turbine at work, then after a moment fell again to the above noted limit below which we could not force it.

The pumping was continued for 6 hours, after which time, as the results continued negative, I had the pump stopped at 23 o'clock, and closed and shored up all the orifices communicating with the forward boiler compartment.

The divers tried to discover from the inside the leak in the forward boiler room, which we supposed consisted, as in compartment 88, of a laceration of a man hole produced by a kingston or by two reentering kingstons; but in vain.

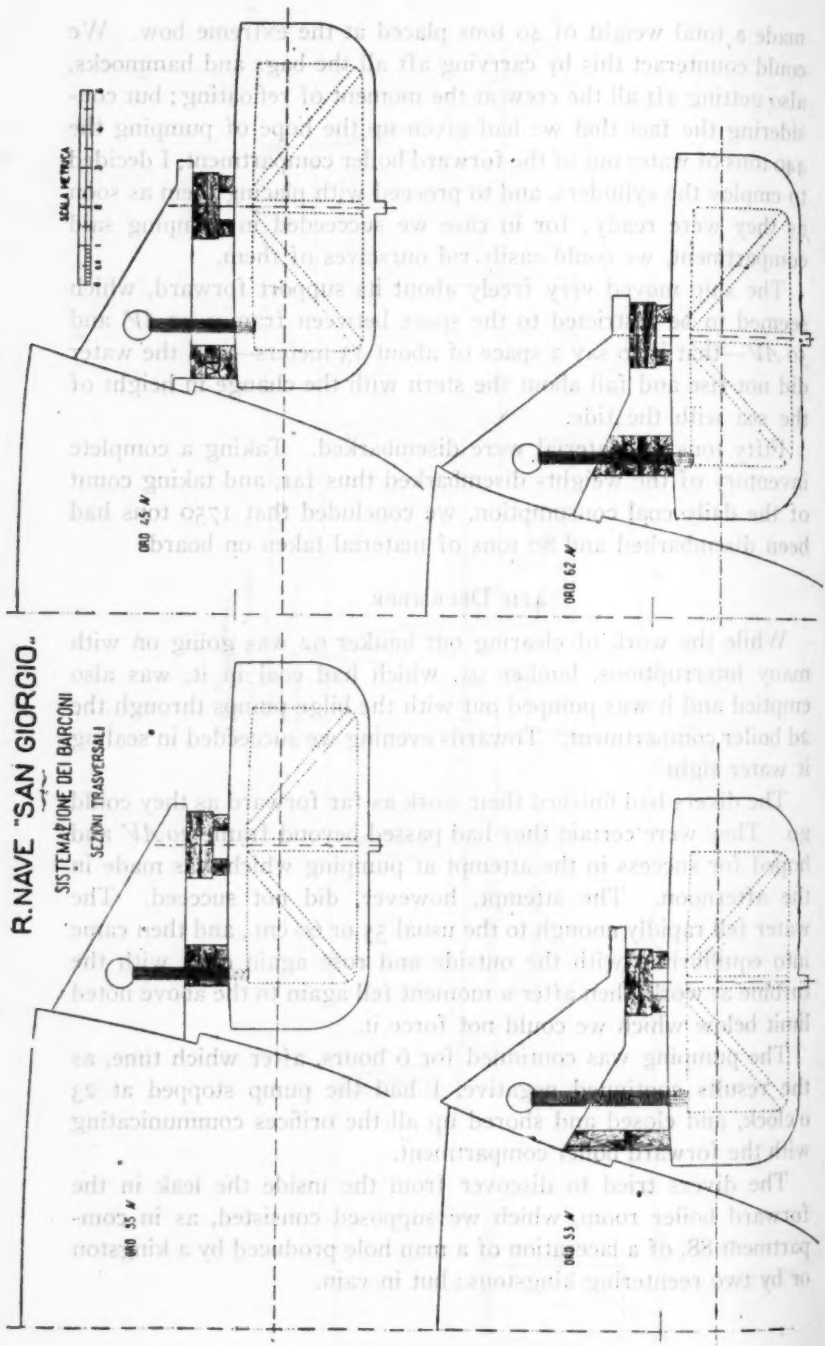

R.NAVE "SAN GIORGIO"
SISTEMAZIONE DEI BARCONI
SEZIONI TRASVERSALI
SCALA METRICA
ORD 45 AV
ORD 62 AV
ORD 35 AV
ORD 53 AV

FIG. 7

The work of rigging up one of the lighters to take the brackets was finished. This rigging consisted of shores of 30 x 30 and 25 x 25 cm., arranged like a V reinforcing the beams on top of which were placed two longitudinal angle irons or stringers of steel 40 x 40 cm.

The scow was 35 meters long by 9.50 meters beam; these dimensions may give an idea of the seriousness of the work. The work of rigging up the second lighter was commenced. The *Vulcano* was able to handle the stringers with her cargo boom.

The question of getting rid of the lighters under the brackets once the refloatation was accomplished was also considered. Once the ship should be left free from external buoyant effort under the bow, it would assume a line of floatation which, with the forward boiler compartment full of water, would cause the bow to go down to about 7.90 meters; and the lower edge of the brackets would be almost at the water's edge. The wooden lighters could be flooded and suspended for security by tackles, and if it was deemed desirable not to use them again it wou'd be sufficient to put into force the cylinders, then cast off the lighters and later on let go the cylinders. Through the hawse pipe of the sheet anchor a strong bridle of 18-cm. steel hawser was run out for securing the 150-ton sheers in order that they might be used to assist in the operation of getting rid of the lighters, and also for its possible use during the refloatation should this prove necessary.

The sheers that had been secured to starboard and the floats that could be dispensed with were sent into port.

5TH DECEMBER

During the night as we were impatient to empty and uncover the watertight door in the boiler compartment of bunker 92, a drainage hole was made in the bulkhead between it and bunker 94 which had already been dried out. The drainage was premature and the violence of the water was such that the men were caught and hindered in placing the leak stopper (which fortunately they had ready) until it threatened to fill up again bunker 94.

While this was going on a dry squall of the *scirocco* threatened to drive ashore all the floats remaining alongside. Fortunately none were lost or damaged. Part of these craft were sent into port and part moored under the lee of the ship.

In order to continue the work on the brackets a staging was rigged.

The work of rigging the second lighter for use under the brackets presented grave difficulty. All the workmen from shore suffered from seasickness or were hindered by the motion of floats and ceased to work. I therefore had the *Ercole* tow the lighter into port.

I had the fires spread and the engines got ready and while I hove in on the chain and the wire hawser of the 3d anchor, I backed, first the port engine, then the starboard both at full power, in the hope of moving the stern to starboard. We got in a length of chain to starboard, a half length to port and about 10 meters on the steel hawser.

Later the wind tended to veer to *libeccio* and the sea calmed down somewhat. Several plates of armor were disembarked, and the second pair of brackets was placed. The port one went easily to its place but the starboard one worried along to a late hour on account of the difficulty of managing it from the pontoon in the thrashed up sea.

6TH DECEMBER

Bunker 92 was finally emptied and the false watertight door was successfully applied to the opening, whose door leaked more than the one previously uncovered.

The drainage by way of bunker 94 was accomplished and the drying out of bunker 96 started.

The water remaining on board was in the neighborhood of 850 tons, more than one quarter less than the maximum quantity provided against at refloatation.

The water which came on board immediately after the grounding we calculated at about 1600 tons, of which 750 had been pumped out.

During the morning, assisting again with the engines, the moorings aft were again hove taut, this partly to ascertain which anchors had held fast and which came home for reference during the operation of floating off.

The chain from aft to port under the haul from the forward capstan did not give more than a few links; likewise the steel hawser resisted to full power on the after winch, a pull not less than 30 tons. The chain to starboard, (60 cm.) which was

fast to a heavy backed up anchor, gave a half length of chain in addition to the length got in the day before. It was evident that this anchor did not have a good hold and I sent word to get ready. A 7-ton anchor backing it up with 2 lengths of chain and a 4-ton anchor, securing all with 10 lengths of our chain (60 cm.).

The slings for the first pair of cylinders having been finished I had one of the cylinders towed alongside to port.

The third pair of brackets came on board, and the work of securing them began.

The wind veered to the west and blew rather fresh.

7TH DECEMBER

The water from bunker 96, which bunker was almost full of coal, was drained off and the work of getting out the coal commenced.

In the early hours of the morning there were violent rain squalls coming frequently from the west. Later it hailed so violently and in such large stones that the decks seemed covered with snow.

We laid out the anchor which had been prepared during the night; we did not succeed in getting the end of the chain on board during the whole day.

The ship moved without much strain about her support, but it appeared, especially in the change of sea, that she pounded on the keel. From the ranges it appeared that she had moved aft about 20 cm., this also appeared from the position of an iron tube which had been driven into the bottom opposite a mark on the bow. The ship had also moved slightly stern to starboard.

The squalls continued all day, always more violent; the wind had hauled a little to northward and blew boisterously, so that the second cylinder could not with prudence be brought to the starboard side where the sea was highest.

Towards evening the ship began to labor and pounded hard, whether with the bow or the keel, it was impossible to know.

We tried to haul further taut the moorings, and also tried to haul her athwartships, first to port then to starboard, but without bettering the conditions, which now gave us much anxiety.

We succeeded in placing the 4th pair of brackets.

It continued to rain hard.

8TH DECEMBER

In the early hours of the morning the weather got somewhat better, and we got the second cylinder alongside to starboard. Much time was lost passing the fifth part from forward because of its carrying away 3 times. Towards evening we commenced passing the first sling for the port cylinder, leaving it slack in order to admit passing of the corresponding sling for the starboard cylinder. But it was necessary to interrupt the work on account of the heavy sea. With coal bags filled with cork, we tried to fend off the cylinders and keep them from doing damage as they pounded against the side.

The end of chain from the last anchor laid out was recovered and secured on board.

The wind came up again with violence from the northwest but the rain stopped, which gave relief to all, especially in the battery deck where, through the numerous coal scuttles which were left open for the leads of the gear, it rained in torrents.

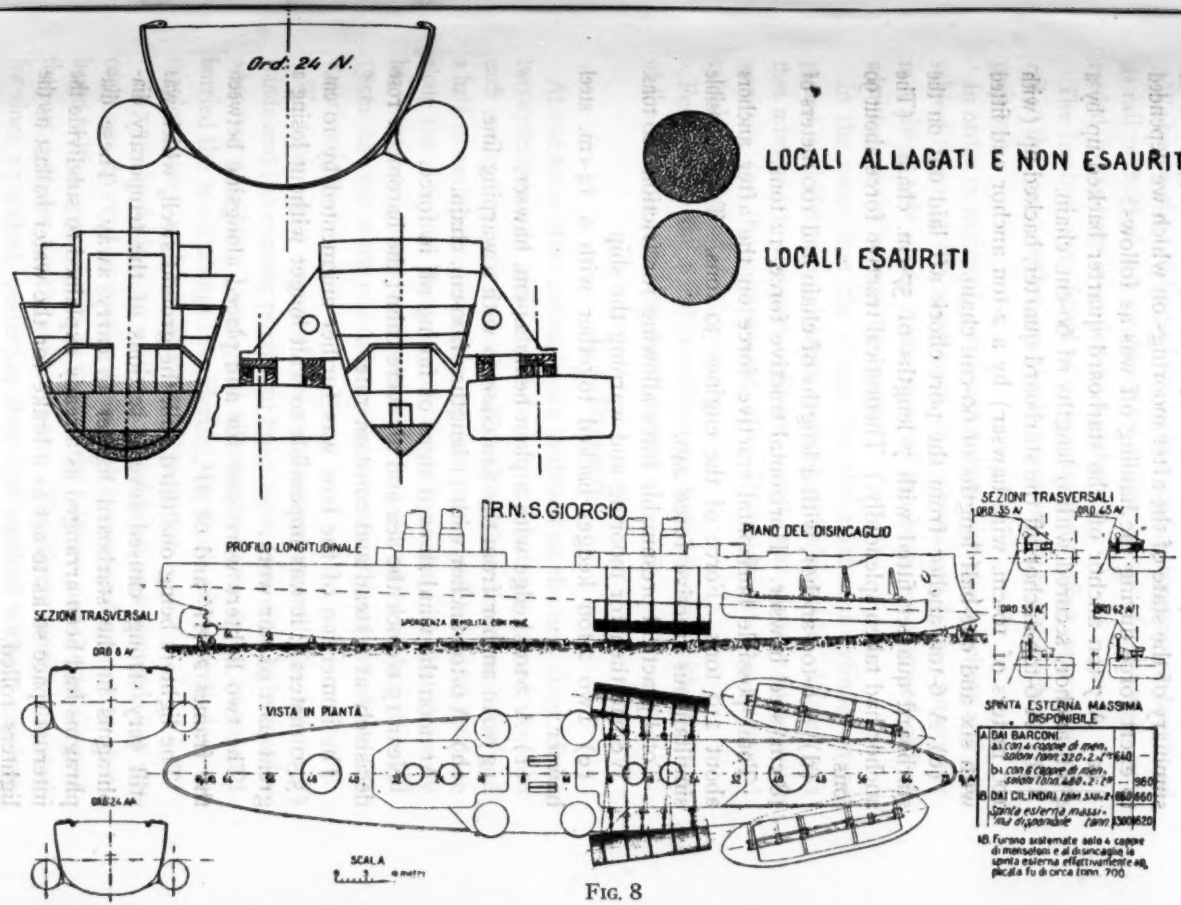
9TH DECEMBER

Since yesterday the north wind had got stronger and stronger and about one o'clock blew with great violence and all through the night the ship was kept in torment. On the port side under the third bulkhead, pressure formed in a double bottom and an adjacent one showed signs of leaking and to starboard at the 4th bulkhead a kingston, which had already been shored up, forced its cover, without however crushing it, the leakage through which showed possibility of augmentation. By choking a strainer the drainage from a bunker was stopped and the infiltration accumulated in the well of the second boiler compartment. We shored up all the kingstons in the second boiler compartment, closed all its communications and tried out its pumping system.

Great difficulty also arose in the work of placing the brackets. The workmen were worn out, and the wind, the rain, and the sea added special difficulty to this naturally difficult work.

An attempt was made to secure the cylinders but the sea was rough and forbade any work by the divers until noon when it commenced to clear.

We had already recovered the moorings, and cast loose and veered the lengths hove in during the preceding days. One chain


Ord. 24 N.
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LOCALI ESAURITI
R.N.S.GIORGIO
PROFILO LONGITUDINALE
PIANO DEL DISINCAGLIO
SEZIONI TRASVERSALI
SPORGENZA DEMOLITA CON MINE
ORD 6 AV
VISTA IN PIANTA
ORD 24 AR
SCALA
SEZIONI TRASVERSALI
ORD 35 AV
ORD 45 AV
ORD 55 AV
ORD 62 AV
SPINTA ESTERNA MASSIMA DISPONIBILE
A) DAI BARCONI
a) con 4 coppie di mens. saldoni tonn 320 x 2 =
b) con 6 coppie di mens. saldoni tonn 660 x 2 =
B) DAI CILINDRI tonn 340 x 2 =
Spinta esterna massima disponibile tonn
N.B. Furono sistemate solo 4 coppie di mensoloni e al disincaglio la spinta esterna effettivamente applicata fu di circa tonn. 700

FIG. 8

had to be cut away because of the impossibility of easing it off. A summary of the state of the after moorings on which we depended to exert force during the hauling off was as follows:

(a) A 7-ton anchor off the starboard quarter backed up by a 4-ton anchor, secured with 9 lengths of 60-cm. chain.

(b) A 6-ton anchor off the starboard quarter, backed up (with 100 meters of 16-cm. wire hawser) by a 2-ton anchor and fitted with six and one-half lengths of 60-cm. chain.

(c) A 6-ton anchor from the port chock aft laid out on the starboard quarter fitted with 7 lengths of 57-cm. chain. (The anchor had taken splendidly.) Theoretical tractive force about 90 tons.

(d) A 6-ton anchor, with 4 lengths of chain and 100 meters of 18-cm. steel hawser. Horizontal tractive force, 12 tons.

Total possible horizontal tractive force on the after anchors about 210 tons. Force of the engines 30 tons. Total possible simultaneous tractive force 240.

Total practical presumable force allowing for friction 180 tons.

We had then for mooring and warping the ship

(e) Two 2-ton kedges backed together with a 14-cm. steel hawser.

(f) A 2-ton kedge with a plain hemp 24-cm. hawser.

(g) An anchor from the *San Giorgio* with a warping line.

(h) A 6-ton anchor with 11 lengths of 60-cm. chain.

At noon the wind showed signs of falling off in force.

Near 15 o'clock the sea and air were calm; the barometer rose decisively at a stead and constant rate.

The immersion of the bow was further augmented by 10 cm. (5.50 meters); it was impossible to wait longer without losing a great part of our work.

The two lighters were sent for and placed alongside between the frames *29 AV* and *68 AV*.

The lighters being one third full, the ground swell, which was still very strong, caused several sections of the temporary diaphragms in the starboard lighter to carry away. These diaphragms had been arranged as already explained to subdivide the internal space so as to act as a brake for the water ballast as the lighters rolled.

Riggers, working now in the water, now clinging to a shore, replaced and shored up the diaphragms in half an hour.

We began the refilling of the lighter and as soon as the height of its rail permitted we, profiting by falling away of the swell, succeeded in placing it under its brackets.

The fenders were fitted at once, also the chafing gear along the rail so that even with a sea the lighters would not shift from their positions.

In order to maintain constant contact with the brackets and not subject them, at the same time, to a premature force consequent to a rising tide or an immersion of the bow, we pumped out or admitted water as was necessary.

In the meantime the slings for the starboard cylinder were passed, and the two cylinrers were placed alongside. Water was then admitted to the port cylinder, which was already fitted with manivels for the compressed air. By midnight the starboard cylinder was sunk.

Fortunately the wind continued to diminish and with the turn of the tide the sea also went down.

10TH DECEMBER

At one hour after midnight we tautened up the first sling of the two cylinders. It took about two hours but we gained time on each succeeding pair and averaged altogether about an hour and a half to each pair. It was a tedious work, which had to be done along the side just above water, because of the fact that the very heavy securing stands to which were secured two eyes of steel 13-cm. hawser were not more than a meter and a half above the water's edge.

We took eight turns of 12-cm. hawser around the securing stands and the coaling ports and hove them taut with light tackles whenever possible. I wished at all costs to be ready by 10.30, and hurried the work along, considering the work on the cylinders as supplementary and not absolutely essential.

At 7.30 the fifth sling of the port cylinder was secured, but we could not succeed in getting home the corresponding one to starboard, which appeared to be foul of the bottom, nor the 3d sling of the port cylinder for the same reason. The divers were exhausted for since 15 o'clock yesterday they had worked without ceasing, either under water, above water, or inside. I concluded that four slings each would be enough, and commenced to give the air to the cylinders. The force required of these cylinders was arrived at

by taking into count the buoyancy given by the lighters, allowing these to give the maximum moment of rotation about a point at the middle of the hull. Granting that the lighters should give a maximum force of 300 tons each, the cylinders did not need to give more than 100 tons.

The cylinders emerged slowly: two more plates of the amidships armor which had been got ready during the night were disembarked; all the tools and material which apparently would not be used were disembarked; the bags and hammocks were carried to the extreme stern; the thwartships steel hawser to starboard and the after tackle to port were let go. The forward chain had been let go the evening before as it interfered with the starboard lighter's coming alongside. The engines were warmed up. The weather had turned perfect.

The port cylinder emerged horizontally and commenced to take; that to starboard remained inclined with the after end on the bottom, while the after sling came very taut.

The diver, sent to examine it, returned and reported that the cylinder touched lightly on the bottom and that the sling was fast in the mass of conglomerate which lay under *8 AV*. These were moments of great anxiety. This mishap might have stopped for all day the work of refloating.

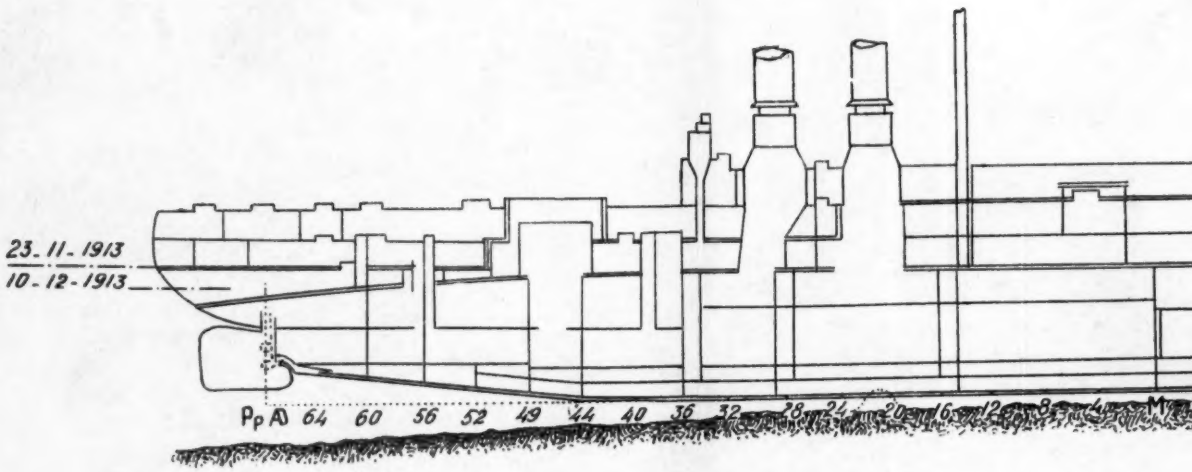
I had the moorings aft slacked off a bit and hove in with a winch on the thwartship line aft and to starboard. While I was assisting at this operation it was reported to me that the starboard cylinder had now come horizontal. The diver was again sent down and he reported that the sling had broken loose from the reef. The moorings were again hove taut.

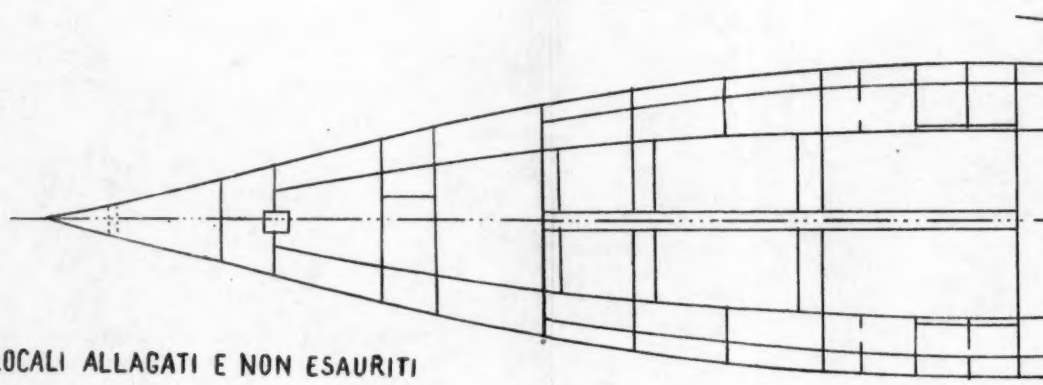
It was 10.45; from the lighters whose shores groaned under the force, we continued to pump. The bow gave signs of lifting.

The captain was on deck and understood that when the internal level of the lighters had reached a certain bench mark, he should signal with a blast of the bugle to heave around on the capstans, and as soon as these were in motion, he would go to the control on the quarter deck and start first the port engine then also the starboard one backing at full force.

I was at the extreme stern: it was 11.05 o'clock when the blast of the bugle was heard: all the capstans hove round; from aft the blast of the bugle was answered and the port screw began to turn violently.

3-11-1913





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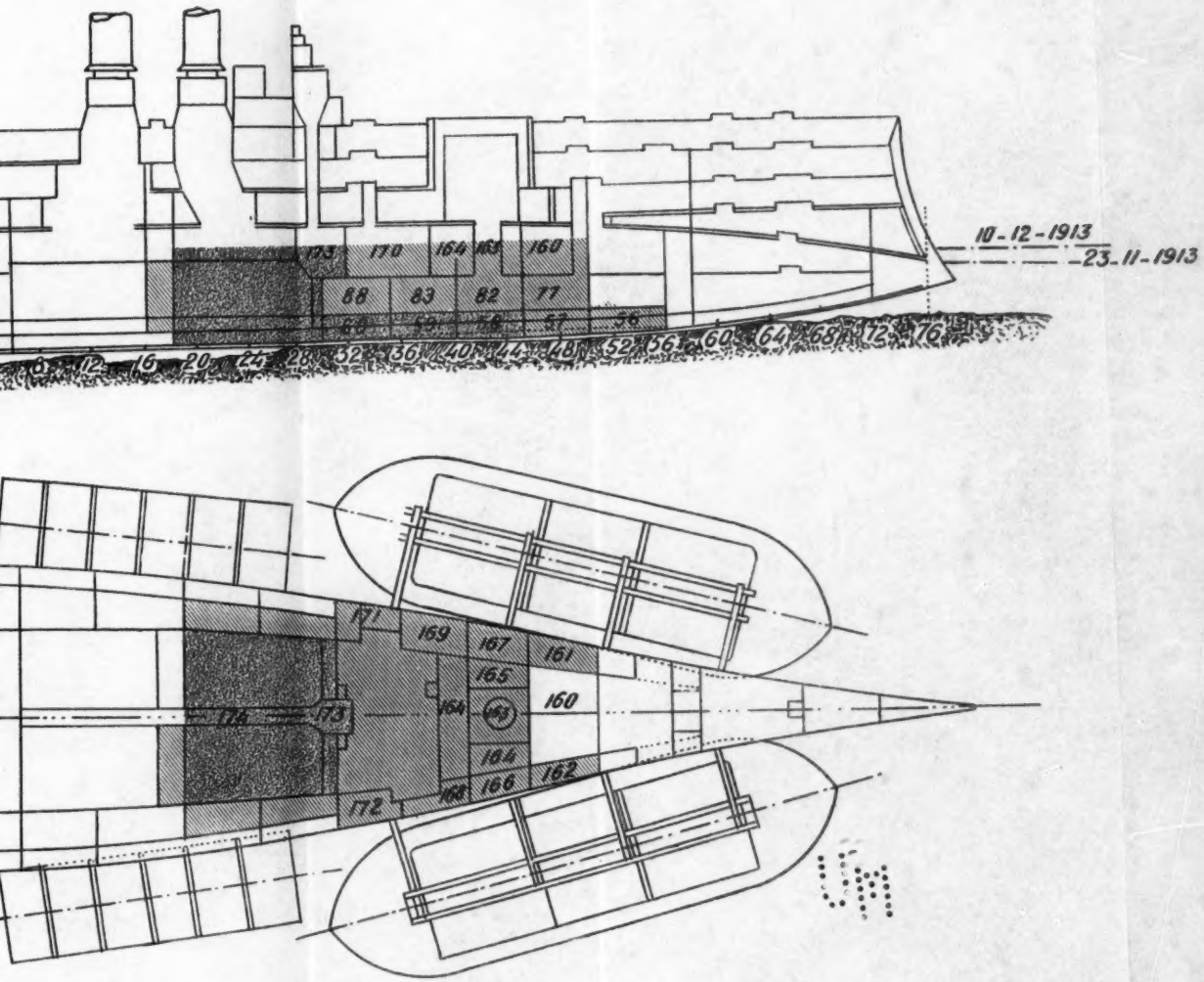
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FIG. 9

It seemed that the ship came off slightly with the stern to port. The starboard screw came also into motion; the chains creaked; the ship went slowly astern without shock and, as soon as the chains were veered out, came off rapidly with the bow to starboard. It was 11.11 o'clock: we were in free water.

The forward chain had been slipped as soon as the ship commenced to move. There were now let go, the hemp hawser and the 18-cm. steel hawser and the 3 after chains; a very delicate operation for the places of letting go were not adapted to that service, but all went orderly, rapidly, and well. At 11.30 the ship, completely free, got way on and headed for Messina.

There were kept alongside the two cylinders, the two lighters and the two pumping tugs secured to the lighters to aid them should the movement of the ship produce any excessive strain.

During the 18 days and a half of being aground there had been disembarked 2000 tons of material of which a good half was in pieces of between 20 and 70 tons, and very difficult to sling. Only one small accident occurred, and this incurred only an inconsiderable hurt to an Armstrong workman who after 48 hours in the sick bay reassumed his work.

During the work I never heard a phrase or a single word of complaint or lamentation. I never heard a petty officer have to urge on his men to their work, or never a disagreement as to whose turn it was to work or to rest. Furthermore, in the first days, these men were given only 5 or 6 hours rest in 24 and rested badly during that, and they had worked always with the greatest intensity, taking their meals very hurriedly. I have seen under officers, petty officers, and men of the crew after having been on their feet from darkness to dawn, continue at their work without apparent exhaustion and with all the energy and enthusiasm of the preceding day.

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

THE SHIPS OF THE UNITED STATES NAVY

AN HISTORICAL RECORD OF THOSE NOW IN SERVICE AND OF THEIR PREDECESSORS OF THE SAME NAME

1776-1915

By ROBERT W. NEESER

DELAWARE

DELAWARE.—One of the original thirteen of the United States. It was first visited by Henry Hudson in 1609, and, in the year following, by Lord Delawarr, Governor of Virginia, who entered the bay in 1610. The Dutch made the first attempt at settlement; then the Swedes, in 1638, founded New Sweden; but, in 1655, on the appearance of a Dutch fleet the New Netherlands colony was restored. In 1664, after the surrender of New Amsterdam, the Delaware settlements passed into the hands of the English. In 1774 and 1775 the colony was represented in the Continental Congress, and after its independence had been won, Delaware was the first of the states to ratify the Federal Constitution.

The battleship *Delaware* is one of the two capital ships authorized by the 59th Congress. She is an armored steel vessel of the first rate, of 20,000 tons displacement, with the following dimensions: length, 510 feet; breadth, 85 feet, 2½ inches; mean draft, 26 feet, 11 inches. She is fitted with twin-screw vertical triple-expansion engines, of 29,529 h. p., which, on trial, gave her a speed of 21 knots. Steam is furnished by 14 Babcock and Wilcox boilers. In the *Delaware*, the idea of the all big-gun ship, so successfully inaugurated in our *Michigan* class, was continued, and ten 12-inch B. L. R.'s were mounted in pairs in five center-line turrets, two placed on the forecastle, the second firing over the first; two aft on the main deck on the same level; and one amidships, firing over the two after turrets. For defence against torpedo attack fourteen 5-inch R. F.'s are mounted in the central battery and forward and aft, while two 21-inch submerged torpedo tubes have been fitted for offensive action. Her complement is 52 officers and 886 men.

The *Delaware* was built at the yards of the Newport News Shipbuilding Company at Newport News, Va. Her keel was laid on November 11, 1907, and she was launched on February 6, 1909. The contract price of her hull and machinery was $3,987,000.

The *Delaware* first went into commission at the Norfolk Navy Yard on April 4, 1910, under the command of Captain Charles A. Gove. After a month's "shaking-down," she joined the Atlantic fleet at Hampton Roads, and shortly after participated in the fall target practice exercises. A voyage to Europe followed, after which Captain Gove received orders to proceed on a cruise to South American waters. This special service was ordered to test fully the reciprocating engines with which the *Delaware* had been fitted and thus compare their efficiency with that of the Curtis turbines which had been installed in her sister ship, the *North Dakota*. On April 26, immediately upon her return to Boston from the extended South American cruise, the *Delaware* was subjected to a surprise full-power run of 24 hours, and this was followed in about a month by another cruise to England to participate in the parade held at Portsmouth in connection with the coronation of King George V. And this complete round trip the *Delaware* completed without taking aboard any fuel during the trip and with 600 tons of coal left in her bunkers at the conclusion of her cruise. The old bull-dog of the navy, the *Oregon*, had found a worthy successor in the *Delaware*.

On November 20, 1911, Captain Gove was relieved by Captain John Hood. Leaving the navy yard, Brooklyn, N. Y., on January 4, 1912, after an extensive overhauling, the *Delaware* participated in the usual fleet exercises and maneuvers. On October 24, 1912, Captain Hugh Rodman assumed command, and he, in turn, was relieved, on December 22, 1913, by Captain William L. Rodgers. When naval occupation of Vera Cruz took place, the *Delaware* was undergoing repairs at the Norfolk Navy Yard, but by July 1 these were completed and she joined the fleet in Mexican waters on July 8, remaining there until early in October, when she left the Carribean and returned to American waters.

The wooden screw sloop *Delaware*, launched in 1863, was the fifth ship to bear the name of the Blue Hen State. She had originally been known as the *Piscataqua*, but on May 15, 1869, this

was changed to *Delaware*. The *Delaware* was a ship of the first rate, of 3953 tons displacement and with a tonnage (old measurement) of 3177 tons. She was built by the government at the Portsmouth Navy Yard, at a cost of $1,177,895.04. Her principal dimensions were: length, 312 feet 6 inches, and breadth, 46 feet. Her engines were of the horizontal back-acting type, and she had four main and two superheating inclined boilers. In November, 1867, her battery consisted of one 60-pounder rifle, two bronze 20-pounders, two 100-pounder Parrotts, sixteen 9-inch smooth-bores, and three 12-pounder howitzers.

On May 15, 1869, the date on which the ship received her new name, the *Delaware* was at Shanghai, in command of Captain E. English. She was the flagship of Rear Admiral Stephen C. Rowan, the commander-in-chief of the Asiatic fleet. This duty she continued to perform until her recall to the United States in 1870. When she reached the New York Navy Yard, on November 19, 1870, she was found to be greatly in need of repairs, but the cost of these repairs exceeding that of building a new vessel, she was offered for sale at auction. The sum offered by the highest bidder, however, was inadequate, so the vessel remained on the Navy Register, and was maintained at the navy yard in ordinary, until, one day in 1877 she foundered at her dock. She was thereupon sold, in February, 1877, to N. McKay for $5175.

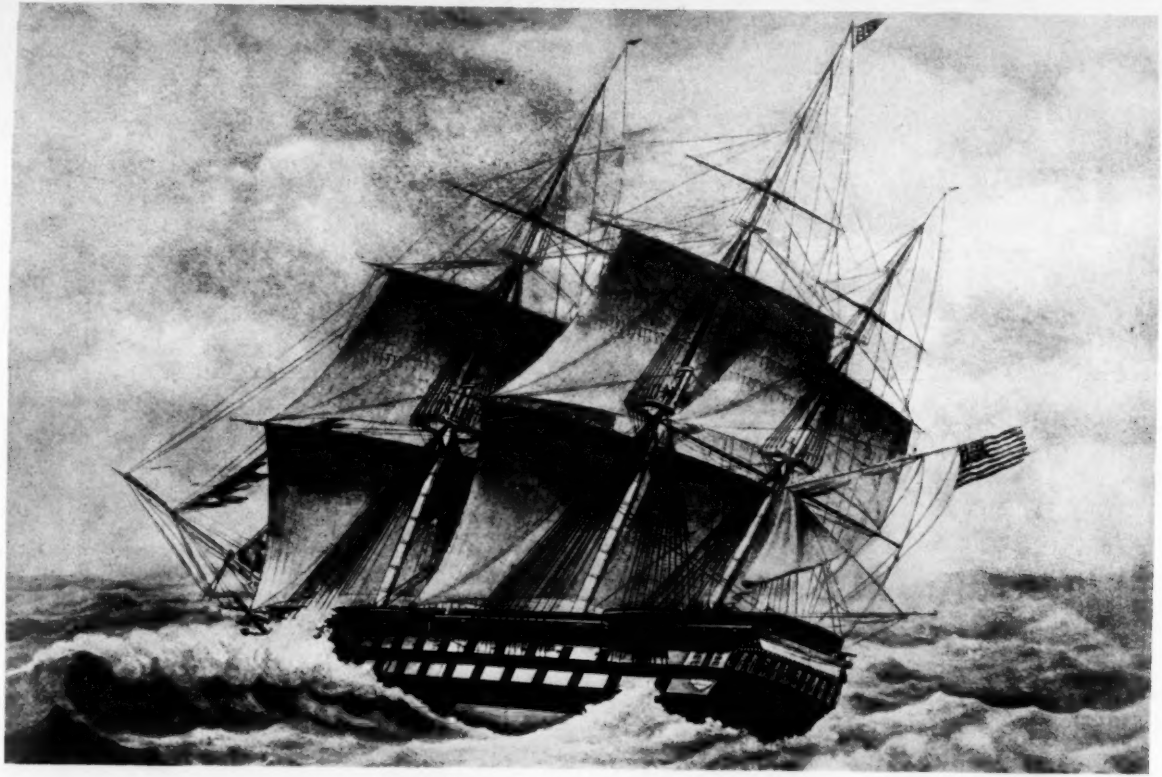
The fourth *Delaware* was an iron side-wheel steamer bought at Wilmington, Del., on October 14, 1861, from the Harlan, Hollingsworth Company for $45,000. She was a schooner-rigged vessel of the fourth rate, launched in 1861, of 161 feet length, 27 feet breadth, 8 feet 3 inches depth of hold; and 6 feet draft. She had one beam engine of 6 feet stroke, which, under favorable conditions, enabled her to steam 13 knots. When the *Delaware* was first placed in commission, she carried four 32-pounders and one rifled 12-pounder. This armament, on January 19, 1862, was changed to one 9-inch smooth-bore, one 32-pounder of 57 cwt., and one rifled 12-pounder. On October 1, 1864, a heavy 12-pounder was added; but this was removed on the last day of the year. The *Delaware* carried 13 officers and 68 men.

The *Delaware* went into commission at the Philadelphia Navy Yard on December 7, 1861, and five days later she sailed on her first cruise in command of Lieutenant S. P. Quackenbush for

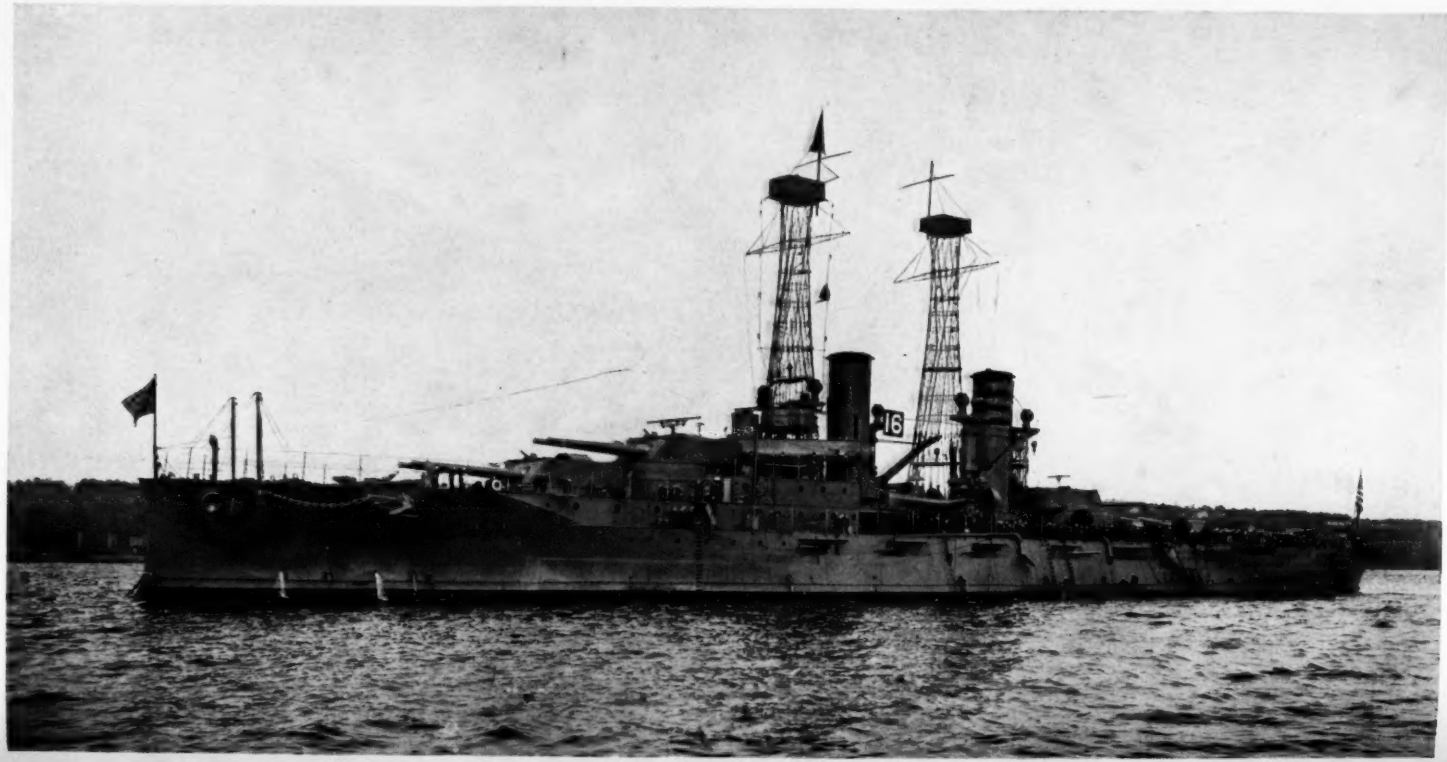
duty with the North Atlantic blockading squadron, which she joined off Fort Monroe with her "batteries ready for action." But the blockade duty turned out to be uneventful and it was not until December 29 that the ship was called upon for special service. On that day the Confederates cut out a Union schooner. Lieutenant Quackenbush was ordered to go in chase, but the enemy retreated behind their batteries on Craney Island, leaving to the *Delaware* merely the satisfaction of expending a few "grape-shot and shell" on the works at Sewell's Point.

The concentration of the Union land and naval forces in North Carolina waters early in 1862 brought the *Delaware* to Hatteras Inlet about the middle of January. She was thus in time to participate in the battle of Roanoke Island, on February 7, in the course of which she effectively shelled Fort Sullivan and covered the landing of a large Union force from the transports. Three days later, as flagship of Commander S. C. Rowan, the *Delaware* formed part of the flotilla which engaged and destroyed the Confederate naval force and batteries at Elizabeth City, N. C., and from February 18 to 20 she took part in the reconnoissance of the Chowan River, N. C., after which Lieutenant Quackenbush was ordered to Pamlico Sound, where on March 5 and 6 he made two prizes. In the capture of New Berne, N. C., on March 14, and in the expedition to Washington, N. C., on March 21, the *Delaware* took an active part. As her log records her work, the *Delaware* on March 31 ran down the river and seized two large schooners; on April 4, she sent a boat's crew ashore and fired a fort and magazine on the embankment; on April 5, she entered the Neuse River, running up to Elizabeth City on the 20th; on April 23, she met a flag of truce ashore; on June 11, she ran to the mouth of the Appomattox River and shelled some Confederates; on June 17, a masked battery was silenced at City Point; on July 1, she ran down-stream and entered the James River where she continued her operations with the "upper fleet" at and above Harrison's Bar; on August 4, she "received Commodore Wilkes on board, started down the river, came to anchor in Hampton Roads at 11.30 p. m."

In September, 1862, the *Delaware* was in the Potomac River, where, on September 14, 1862, off Blackstone Island, Lieutenant Quackenbush was relieved in command by Acting Volunteer Lieutenant Amos P. Foster. On September 26, she was ordered by



U. S. Ship of the Line "Delaware"



U. S. S. "DELAWARE"

Admiral Lee to the Nansemond River to intercept and capture the mails which were passing between Norfolk and Richmond. "The *Delaware* is precisely what we want" wrote General Dix from Fort Monroe on October 1. It was while engaged in this duty that the *Delaware* was chased and fired upon by the Union tug-boat *Zouave,* on October 29, but the log of the *Delaware,* curiously enough, does not mention this incident.

On November 6, Lieutenant Foster was ordered to proceed to New Berne, N. C., with ordnance stores for the fleet. On December 5, Commander Murray of the *Hetzel* was "fortunate enough to fall in with the *Delaware,* the only vessel that will suit our purpose." So Lieutenant Foster took part in the naval reconnoissance held in the Neuse River in cooperation with the army expedition against Goldsborough, N. C., from December 12 to 16. But, says the log, on December 11, the ship "ran aground;" on the following day Commander Murray left the vessel and went aboard the *Seymour;* on December 13, "heard heavy firing in northerly direction. At 12.30 p. m., succeeded in getting our vessel afloat proceeded down the river, but at 1.30 ran on sunken stumps in the river and held fast" until the next day when assistance came and the ship could be towed to New Berne. Here the necessary repairs were quickly effected and the vessel was again ready for service, as shown by Commander Murray's report of January 21, 1863, which states that "the *Delaware* is in good condition."

From this time on, the *Delaware* remained in the Sounds of North Carolina, making occasional visits to New Berne, Bodie's Island, and Washington, until December 11, 1863, when she left for Baltimore with the *Henry Brinker* in tow, both vessels being in need of repairs. At Baltimore, Acting Master J. H. Eldridge assumed command of the *Delaware,* and on March 27, 1864, he sailed for Newport News, Va., where, on April 13, he was ordered into the Nansemond River on special service. Returning to Newport News, the *Delaware* was stationed "on general guard of the ironclads and the *Minnesota.*"

When, on July 28, 1864, Captain Melancton Smith was assigned to duty as divisional officer in command in the James River, the *Delaware* was attached to the flotilla placed under his charge, and she consequently participated in the operations attending the advance of the Union forces at Dutch Gap and Deep Bottom on August 13 and 16. In January, 1865, Acting Master Eldridge

paid a short visit to the navy yard for repairs, but in February the *Delaware* was again at her station "on picket." Early in March, 1865, the ship was transferred to Commodore Foxhall Parker's Potomac flotilla with which she took part in the combined army and navy expedition to Fredericksburg, Va., on March 6-8, 1865. This was the last important service rendered by the *Delaware* in the war. On July 27 she returned to the Washington Navy Yard and nine days later she was placed out of commission, to be purchased, on August 30, by the Treasury Department for $40,000.

The third *Delaware* was a 74-gun ship-of-the-line built by the government at the Norfolk Navy Yard. She was a wooden vessel of 2633 tons, with the following principal dimensions: length, 196 feet 3 inches; breadth, 53 feet; depth of hold, 22 feet 2 inches; draft, 26 feet 2 inches. Her armament in October, 1841, included eight 8-inch smooth-bores, 28 long 42-pounders, 30 long 32-pounders, and twenty-two 42 pounder carronades. This battery, in 1850, was changed to twelve 8-inch smooth-bores and 72 long 32-pounders. The *Delaware* was authorized by the act of Congress approved April 29, 1816; she was laid down in August, 1817, and launched in October, 1820. The cost of her construction amounted to $543,368. Her complement was 820 officers and men.

The *Delaware* made her maiden cruise in command of Captain John Downes (December 5, 1827), sailing from Norfolk on February 19, 1828, for the Mediterranean station, where she flew the broad pennant of Commodore Crane. This cruise lasted exactly two years, and at its expiration the *Delaware* returned to Norfolk, and was placed out of commission on February 10, 1830. Three years later, the ship was again placed in service and ordered to her old cruising ground in the Mediterranean. She left Norfolk on January 30, 1833, under Captain H. E. Ballard, as flagship of Commodore D. T. Patterson. At Port Mahon, on February 14, 1834, Captain J. B. Nicholson relieved Captain Ballard in command of the ship, and under him the *Delaware* remained on the station until her return to Norfolk (February 19, 1836), where she was placed out of commission on March 11, 1836.

In 1841, the *Delaware* was placed in commission and used temporarily as a receiving ship until her departure for the Brazil station, on June 4, 1841, where she was ordered as flagship of Com-

modore Charles Morris. Her commander, on this cruise was Captain Charles S. McCauley (March 6, 1841). Two years later, the *Delaware* left the coast of Brazil for the Mediterranean where Commodore Morris exchanged commands with Commodore Morgan. On March 10, 1844, the ship returned to Norfolk and 12 days later was placed out of commission. This was the last cruise made by the ship. From this time on she was maintained in ordinary and she was in this condition when, on April 20, 1861, the activities of the Confederates at Norfolk compelled her destruction to prevent her falling into their hands.

The second *Delaware* was a ship of 20 guns, bought at Philadelphia from Nicklin & Griffith in 1798, under the provisions of the act of April 27, 1798. She was a wooden ship-rigged vessel of 180 tons. Her cost was $59,653, and she was manned by a crew of 180 men.

The *Delaware* was one of the first American cruisers to get to sea after the outbreak of hostilities with France. Her first commander was Captain Stephen Decatur, Sr., a former privateersman and the father of the afterwards famous Decatur. The *Delaware* sailed from Philadelphia on July 6, 1798, in company with the frigate *Constellation,* and before she had been at sea many hours four schooners were sighted. One of them gave chase, mistaking the *Delaware* for a merchant vessel, and thus fell an easy prey to the American cruiser. She proved to be the French privateer *Le Croyable,* of 12 guns, from Cape François, having left that port on June 19 "being ignorant of the existence of war." But, as she had already captured several American vessels, she was brought into port and condemned, after which she was taken into the service and renamed the *Retaliation.* Shortly after, the *Delaware* again put to sea in company with the *United States.* It was on this cruise that the two American vessels, flying the French tricolor, almost came to blows with a large 50-gun ship, also showing French colors, before they could discover her true identity. The stranger proved to be a British ship-of-war, and it was surprising that no collision took place. This incident led to the adoption of a system of private signals whereby American and British vessels might recognize each other and thus avoid future mistakes.

After two months spent in fruitless search for French privateers among the West India Islands, the ships returned to New Castle on September 20. But, as the Secretary of the Navy well stated in his instructions dated December, 1798, "we have nothing to dread but inactivity; the French can have no force in the West Indies this winter equal to ours." Consequently, the *Delaware* and two revenue cutters, with Captain Decatur as senior officer, were designated for the protection of American interests off the north coast of Cuba, between Havana and Matanzas. The schooner *Marsuin* was the only prize that rewarded their efforts.

In 1799, Captain Thomas Baker cruised with the *Delaware* on the Guadeloupe station under the orders of Commodore Truxtun and made prizes of two French vessels, the *Renard* and the *Ocean*. In January, 1800, we hear of her being at Curaçao "in port, with many of her men sick." But her cruise was only temporarily interrupted. In the course of the next month she was mentioned again as active on her station and later in the year, we find her still in service in command of Captain John A. Spottswood. In 1801, in pursuance with the provisions of the "Act providing for a naval peace establishment," the *Delaware* was sold out of the navy.

The first *Delaware* was one of the 13 frigates authorized by the Continental Congress on December 13, 1775, to cost not more than $66,666.66. She was a wooden vessel of 563 tons, 121 feet length 32 feet, 10½ inches breadth, and 9 feet, 8½ inches depth of hold. She was built at or near Philadelphia, on the Delaware River, and launched in 1776. "She mounts 24 Guns on the Upper Deck," wrote Lord Howe on November 23, 1777, "And when furnished with proper artillery is capable of carrying 12-pounders with great facility."

The occupation of Philadelphia by the British, in 1777, however, prevented the *Delaware* from rendering any sea service during the Revolutionary War. General Howe took possession of the city on September 26, and Admiral Howe, his brother, entered the mouth of the Delaware about the same time. The Americans had erected strong forts to prevent his ascent of the river. In these operations the Continental frigate was expected to play a leading part. But on the very first day of the engagement the *Delaware* got aground within 500 yards of the British works and

became exposed to such a heavy fire that Captain Charles Alexander, her commander, was obliged to strike his flag. The *Delaware* thus fell into the enemy's hands and the Americans lost thereby their strongest ship in those waters.

NORTH DAKOTA

NORTH DAKOTA.—One of the United States, originally included in the Louisiana purchase. It was first explored by Lewis and Clark in 1804, and, in 1811, visited by the Astor Expedition. A settlement of its lands was, however, long delayed on account of the numerous Indian wars. On March 2, 1861, North Dakota became a territory, and, on November 2, 1889, a state of the Union.

The *North Dakota* is a first class battleship of 20,000 tons displacement. She was the only capital ship authorized by Congress in 1907. She was built at the yards of the Fore River Shipbuilding Company at Quincy, Mass., and was launched on November 10, 1908, one year after the laying of her keel. Her principal dimensions are: length, 510 feet, breadth, 85 feet 2½ inches; mean draft, 26 feet 11 inches. The *North Dakota* was the first battleship of our navy to be fitted with turbines. They are of the Curtis type, and on trial they developed 32,307 h. p., giving the ship a speed of 21.66 knots. The *North Dakota's* armament, like that of her sister ship, the *Delaware,* comprises ten 12-inch 45-caliber B. L. R.'s mounted in pairs in turrets, all placed on a center line; while for torpedo defence a secondary armament of fourteen 5-inch rifles is mounted in battery and in casemates. There are also two submerged 21-inch torpedo tubes, and 10 smaller pieces of artillery for use in boats and on shore. The contract cost of the ship was $4,377,000. Her complement includes 55 officers and 872 men.

The *North Dakota* was fitted out at the Boston Navy Yard by Commander Charles P. Plunkett and placed in commission on April 11, 1910. Captain Richard T. Mulligan assumed command on May 19, but he was detached (July 4, 1910) before the ship was able to get to sea. On August 1, the *North Dakota* finally left the yard, in command of Captain Albert Gleaves (July 21, 1910) on her shaking down cruise, and in September she joined the Atlantic fleet. During November and December she accompanied the fleet on the European cruise after which followed the usual winter maneuvers in the West Indies.

On November 16, 1911, Commander Reginald R. Belknap relieved Captain Gleaves, and a week later Captain Henry B. Wilson

reported on board in obedience to orders from the department. The next two years were occupied with the regular fleet routine: fleet exercises, target practice, spotting practice, maneuvers, torpedo practice, and experimental firing. On November 23, 1913, Captain Wilson was detached from the ship. His successor was Captain Charles P. Plunkett, but as the latter did not reach the ship until December 22, Commander Orton P. Jackson took charge in the interim.

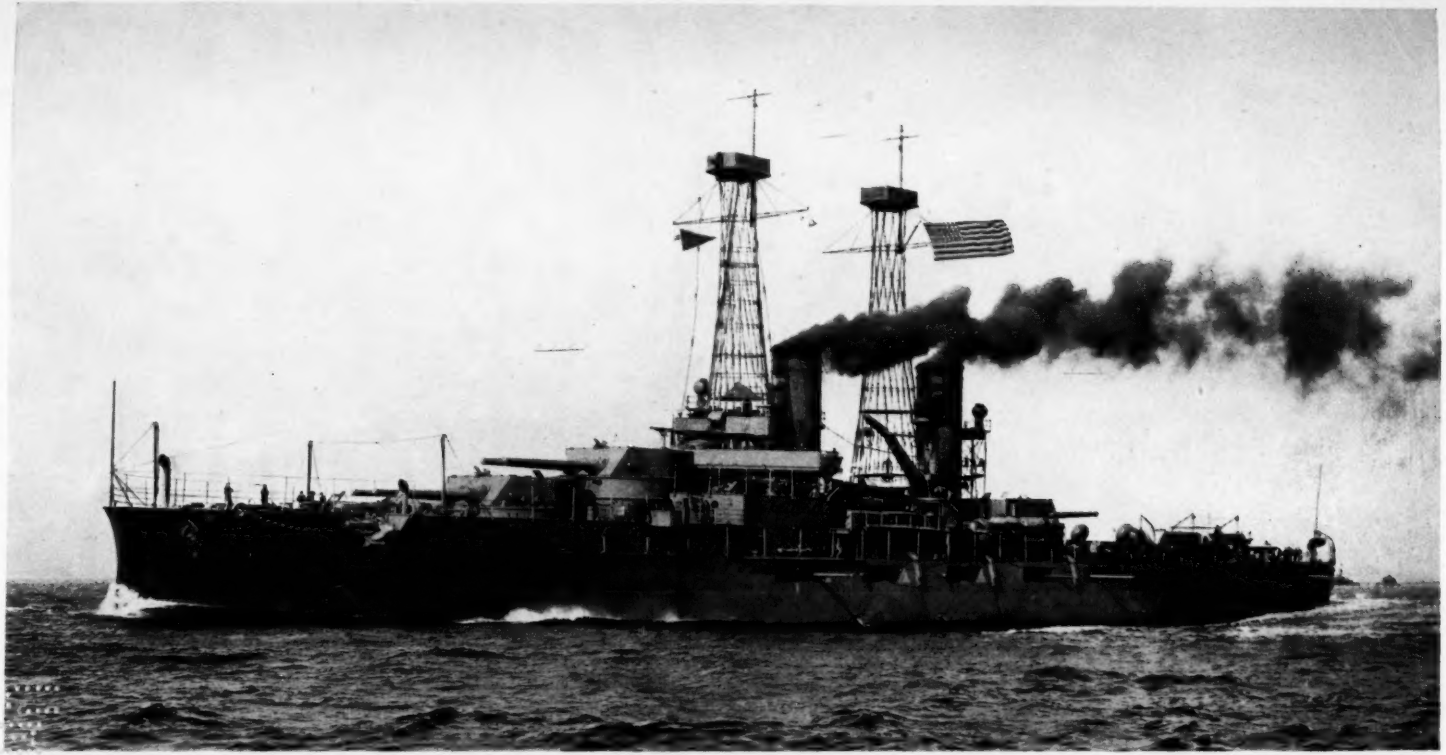
When the naval occupation of Vera Cruz occurred, the *North Dakota* was undergoing a five months' overhaul at the New York Navy Yard. She was, therefore, unable to arrive in time to participate in the landing operations. She did, however, join the Atlantic fleet in Mexican waters on April 26, 1914, and remained for five months "watchfully waiting." Then followed special service at Tuxpam and Lobos Island, a month on the Southern Drill Ground for target practice, and two weeks at New York for liberty, which followed more battle exercises off the Virginia capes before her return to the navy yard. At Norfolk, on January 5, 1915, Captain J. S. McKean relieved Captain Plunkett in command of the *North Dakota* and 11 days later the ship left the yard to rejoin the fleet.

MICHIGAN

MICHIGAN.—One of the United States. It was first colonized by the French in 1620, but ceded to England in 1763. The scene of much fighting during the Revolutionary War, it became part of the United States at the peace of 1783, though Detroit was held by the British until 1796. Michigan became a state in 1837. The name is derived from the Chippewa words, "mitchi"—great, and "sawgyegau"—lake.

The *Michigan* is a first class battleship of the dreadnought type. She was one of the two capital ships authorized by the act of Congress approved March 3, 1905, and the first "all big-gun" vessel to be added to our fleet. She made her appearance afloat some time after the British *Dreadnought* startled the maritime world. But the English admit that her plans were drawn before those of the *Dreadnought* and that she and the *South Carolina* are, therefore, the first "all big-gun" ships.

This arrangement of the battery, says an official report written in 1907, "was in no sense novel, but its desirability under modern conditions of ordnance and artillery fire had not been definitely



U. S. S. "North Dakota"

established. Sketch designs of an all big-gun ship had been made the Bureau of Construction and Repair only a few years previously, but artillery fire had not then developed to such a degree as would have warranted further consideration of such a battery at that time." After the lapse of a few years, however, the general features of the design was again taken up, and, the result was the construction of two vessels whose main battery was to consist of eight 12-inch guns mounted in four middle-line turrets, so arranged as to permit a broadside fire of eight guns and an ahead and astern fire of four guns.

The contracts for the construction of these vessels, which were named the *Michigan* and *South Carolina,* were awarded on July 21, 1906. The *Michigan* was built by the New York Shipbuilding Company at Camden, N. J., where she was launched on May 26, 1908. She is an armored steel vessel of 16,000 tons displacement, 450 feet length, 80 feet, 2½ inches breadth, and 24 feet, 6 inches draft. Her propelling machinery consists of two vertical triple-expansion engines of 16,517 h. p., for which steam is supplied by 12 Babcock and Wilcox boilers, enabling her to make 18.79 knots on her trial trip.

The battery and hull armor protection of the *Michigan* is of a "most substantial character," and the unusually complete watertight subdivision of her hull was designed with a view to ensure the stability and buoyancy of the vessel under damaged condition. There is a 310-foot-long steel belt, 8 feet wide, varying in thickness from 11 inches at the top to 9 inches at the bottom; on the turrets there is from 12 to 8 inches of steel; while the barbettes furnish 10 inches of protection to the turret machinery and ammunition hoists.

The *Michigan* was placed in commission at the Philadelphia Navy Yard on January 4, 1910, in command of Captain Nathaniel R. Usher. After completing her "shaking down" and final acceptance cruises, she joined the Atlantic fleet on March 28, off Cape Henry. Then followed the standardization runs and a short period for repairs at the navy yard, previous to a cruise to Bermuda with the naval militia, a season's exercises with the Atlantic fleet, and a cruise to France and England with the first division of the fleet. On October 6, 1911, Captain Edward E. Capehart relieved Captain Usher. In November, 1912, the *Michigan* became part of a special service division, and in January, 1913, she

visited the Panama Canal with the fleet, previous to engaging in the winter exercises in Guacanayabo Bay. With the outbreak of the disturbances in Mexico, the *Michigan* was ordered into the Gulf of Mexico, and during the summer and fall of 1913, she visited the Mexican ports of Vera Cruz, Tampico, and Progreso, giving such protection as possible to the refugees who flocked to the coast.

On her return north, Captain Albert P. Niblack relieved Captain Capehart in command (December 13, 1913). The winter of 1914 was spent with the fleet, after which followed a short visit to the Philadelphia Navy Yard. Then, in less time than it takes to relate it, the *Michigan* was steaming south with every pound of pressure that her boilers could carry. On April 16 she passed out between the Delaware capes; on April 22, at 2 o'clock in the morning, she rushed into Vera Cruz harbor, having covered the intervening distance of 2033 miles in less than six days, and just in time to participate in the second day's operations that completed our naval occupation of Mexico's principal seaport.

The first *Michigan,* known since June 17, 1905, as the *Wolverine,* was built in 1842. She is an iron side-wheel steamer of 685 tons displacement; 163 feet, 3 inches length; 27 feet, 1½ inches breadth; 12 feet, 9 inches depth of hold; and 7 feet, 10 inches draft. She was built by the government at Erie, Pa., under authority of the Act of September 9, 1841, her keel was laid in 1842, and she was launched in 1844. Her machinery was built by Stackhouse and Tomlinson at Pittsburgh, Pa., at a cost of $49,549, and consisted of two inclined direct acting condensing engines of 8 feet stroke, of 365 h. p., for which steam was supplied by two iron boilers with single return ascending flues. This enabled her to steam 10.4 knots. To-day, with more modern boilers, the ship is credited with a speed of 14 knots.

The battery of the *Michigan,* in the first 30 years of her commission, naturally underwent many changes. Her original armament (November, 1844) included two 8-inch smooth-bores and four 32-pounders. In October, 1845, this was reduced to a single 8-inch gun mounted on a pivot. After the war (February 22, 1865) this was replaced by one 30-pounder Parrott rifle, five 20-pounder Parrotts, six 24-pounder howitzers, and two light 12-pounders. In March, 1866, there were eight howitzers and one

.45-caliber Gatling gun, and this armament was supplanted, in September, 1884, by four breech-loading rifles, three 3-inch guns and two light pieces.

The *Michigan* was built for service on the Northern Lakes, and since her first commission she has been constantly employed, except when the winter months compelled her to be laid up in common with all the vessels navigating those waters.

Her commanding officers have been: Captain William Inman (September 29, 1844), Captain Stephen Champlin (November 11, 1845), Captain James M. McIntosh (March 31, 1848), Captain Oscar Bullus (December 1, 1849), Commander Abraham Bigelow (December 1, 1851), Captain John S. Nicholas (February 27, 1854), Lieutenant G. H. Scott (September 28, 1855), Commander Charles H. McBlair (October 12, 1855), Commander Joseph Lanman (April 1, 1858), Commander J. C. Carter (March 1, 1861), Lieutenant Commander F. A. Roe (November 19, 1864), Commander Andrew Bryson (April 16, 1866), Commander J. E. Jouett (April 7, 1868), Commander George Brown (September 26, 1870), Commander James H. Gillis (October 1, 1873), Lieutenant Commander A. H. Wright (May 30, 1876), Commander Charles H. Cushman (June 5, 1876), Lieutenant Commander A. H. Wright (December 13, 1876), Commander George W. Hayward (August 10, 1877), Commander Albert Kautz (August 12, 1880), Commander J. J. Read (August 15, 1883), Lieutenant Commander J. J. Hunker (April 30, 1887), Commander H. T. Picking (September 13, 1887), Commander George H. Wadleigh (November 16, 1889), Commander G. E. Wingate (December 1, 1891), Lieutenant Commander R. M. Berry (March 30, 1893), Lieutenant Commander B. S. Richards (December 5, 1894), Lieutenant Commander E. H. C. Leutze (April 30, 1896), Lieutenant Commander Richard Rush (April 5, 1897), Lieutenant Commander William H. Everett (March 1, 1898), Lieutenant Commander C. P. Perkins (March 25, 1899), Lieutenant Commander William Winder (January 2, 1900), Lieutenant Commander Charles Laird (February 3, 1904), and Commander Henry Morrell (February 2, 1905). Since June 17, 1905, the *Michigan* has been borne on the Navy Register as the *Wolverine*.

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HISTORY *VERSUS* PROPHECY

By CAPTAIN GEO. R. CLARK, U. S. Navy

Motto: "There will come a time when we shall learn the art of war no more."—JEREMIAH

Jeremiah's prophecy, a consummation devoutly to be wished, seems to be as far from fulfillment as when the prediction was made many centuries ago. In fact, if its author could emerge from the mists of the dim past and behold our modern beautiful instruments of destruction at work in the heavens above, the earth beneath, and the waters under the earth, he would surely revise his prophecy or recall it altogether. Could he but gaze aloft at that strange winged creature, sweeping in graceful curves over sleeping villages, dropping now and then messages upon the children of men with an easy indifference as to whether the target be caisson or cathedral, howitzer or hospital, the just or the unjust, he would be filled with amazement. And then later if he should mark the weirdly diabolical persistency and accuracy with which the radio directed torpedo follows its victim, recalling the swift dartings and turnings of the shark and the swordfish when in pursuit of their prey, his wonder would grow apace, and he would be sore afraid. And as for our remote ancestor, the cave man, could he but note the superiority of all our modern weapons over the crude stone-axe and the awkward war club with which he carried on his arguments with his quarrelsome neighbors, methinks he would flee to his haunts with cries of chagrin and rage.

Not learning the art of war, indeed! The centuries are adding vastly to the sum of human knowledge; adding all sorts of things. Maybe the time will come when we shall be able to kill our enemy without leaving our firesides or interrupting the evening story.

And then it may come to pass that the prediction of a more modern prophet will be fulfilled, and Macaulay's New Zealander will stand on the ruins of London Bridge, that structure typifying the wreck of modern civilization.

The cause of these many perfected weapons is not far to seek; it is found in the gradually lessening interval between wars. In the following table are shown the dates of the major conflicts that have occurred, roughly, in the last two hundred years between the principal powers and the average interval of peace. It will be

United States	Great Britain	France	Prussia (Germany)	Russia
1775	1748	1775	1760	1855
37	27	25	36	22
1812	1775	1800	1796	1877
35	25	55	52	27
1847	1800	1855	1848	1904
14	12	15	18	10
1861	1812	1870	1866	1914
37	27	24	4	
1898	1839	1894	1870	
	16	20	44	
	1855	1914	1914	
	27			
	1882			
	17			
	1899			
	15			
	1914			
Average 31 years	Average 21 years	Average 28 years	Average 31 years.	Average 20 years

Average of all five countries—26 years.

noted that wars may truly be said to occur once in a generation. This is just a cold stare into the face of facts without any attempt to explain, defend, or condemn, but the situation naturally presents us with a choice between two courses of action:

First. Take the gambler's "long shot"; assume that all that has gone before will be suddenly changed; that hereafter universal peace will prevail; that altruism will govern the lives of men; that we may get our slippers and the evening paper and be comfortable. Or,

Second. Be conservative in our gambling; admit that Utopia is a far distant land; that, while it takes two to make a quarrel, it

also takes two to make and preserve peace; assume that there is a reasonable chance of history repeating itself; put our house in order and adopt as our motto the advice of Polonius to Laertes: "Beware of entrance to a quarrel, but being in, bear't that the opposed may beware of thee."

Which course would a business man choose? A life insurance man? A banker? Which course would *you* choose? Shall history or prophecy guide us?

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

THE UNITED STATES NAVY IN MEXICO, 1821-1914

By LOUIS N. FEIPEL

CHAPTER VII

OPERATIONS SUBSEQUENT TO THE MEXICAN WAR, 1854-1870

For nearly six years after the close of the war with Mexico nothing of note occurred in the operations of our navy in the region of Mexico. During the year 1854, however, the sloop-of-war *Albany*, Commander J. T. Gerry, of the home squadron, while cruising in the Gulf of Mexico, put in at the ports of Yucatan, and contributed much to the encouragement and protection of our citizens engaged in commerce in that quarter. From this cruise the *Albany* never returned, being lost, with all on board, somewhere among the West Indies. The steamer *Fulton*, of the same squadron, left Norfolk on May 17 of that year, under the command of Lieutenant J. K. Mitchell, for the purpose of conveying to Vera Cruz the Hon. James Gadsden, our minister to Mexico, who was also the bearer of the treaty which had shortly before been concluded between the United States and Mexico. The *Fulton* remained at Vera Cruz until the treaty was ratified, and then returned with it to Washington.

On the west coast the attention of the Pacific squadron was also turned to Mexico in the course of this year. Our government having received sufficient intelligence to impress it with the apprehension that an unlawful expedition had left, or was about leaving, San Francisco for the purpose of taking possession of territory belonging to Mexico, instructions were sent to Commander T. A. Dornin, of the sloop *Portsmouth*, to render prompt and efficient aid in assisting to arrest and suppress any such unlawful expedition as might be set on foot within the jurisdiction of the United States, and to exercise all lawful means to prevent the violation of law and the infraction of treaty stipulations. To

assist him in this the President authorized him, if necessary, to charter a steamer for a short time. Commander Dornin considered this necessary, and accordingly chartered, at San Francisco, the steamer *Columbus,* belonging to the Pacific Mail Steamship Company. With this steamer and the *Portsmouth* he proceeded along the coast and, by uniting with the civil authorities, contributed largely to the early termination of all unlawful expeditions. Some of the leaders of these expeditions were arrested, and many of the sick and wounded availed themselves of Commander Dornin's offer to return to their homes.

After his efforts to suppress this unlawful expedition against Mexico had terminated to his satisfaction, Commander Dornin received intelligence that about twenty American citizens were imprisoned in close confinement at Mazatlan. He promptly investigated the matter, and finding that their imprisonment was improper, he interfered and demanded their release. They were soon discharged by order of the Mexican Government, and at the instance of Commander Dornin were conveyed, in the revenue cutter *W. L. Marcy,* to San Francisco. The *Portsmouth* also did good service at Acapulco by relieving American steamers from the embarrassment of a blockade of that port.

In the spring of 1858 the *Fulton,* under Lieutenant J. J. Almy, was sent to Tampico to inquire into the circumstances attending the detention of American merchant vessels at that place. Almy arrived off the bar on April 13. He found the two forces, government and revolutionary, arrayed against each other, the latter, under General Garza, besieging the city. Five American vessels had been fired into and detained, and another had half her cargo thrown ashore and her captain imprisoned. General Garza had established a custom-house at the entrance of the river, where he required all merchant vessels to pay duties, and detained such as refused, although they had already paid duties at the government custom-house at Tampico. Lieutenant Almy entered the river with the *Fulton,* placed her in position with her guns ready, and remonstrated against the action of General Garza, demanding, at the same time, the release of the captain and the vessels which were detained, all of which was promptly granted. The *Fulton* remained at Tampico until May, when peace and quiet were again restored. Lieutenant Almy's course was fully approved by the department.

In October, 1858, the sloop-of-war *Plymouth,* Commander J. A. Dahlgren, while attached to the home squadron, visited Tampico, in consequence of certain forced loans levied upon American residents by General Garza, the Governor of Tamaulipas. Commander Dahlgren, in company with the United States consul, had an interview with General Garza, and remonstrated against his measures. Subsequently, on the arrival of the *Plymouth* at Vera Cruz, he represented in person to President Juarez the improper course which General Garza was pursuing, and obtained from him the assurance that the proceedings complained of were contrary to regulations, and that no such levies would be exacted in future. The consul was so gratified with the result of this intervention that he complimented Dahlgren in the following terms: "You have done more for the commerce of this place than all the ships and squadrons belonging to the United States have done since I have had charge of this consulate."

In the latter half of the year 1858, also, the steam sloop *Brooklyn,* Captain David G. Farragut, was ordered to the Gulf of Mexico to convey our minister, the Hon. Robert McLane, and his family to Vera Cruz. Mexico was still in a state of revolution. Juarez, the Liberal president, held the City of Vera Cruz and the principal ports on the coast, while Miramon, of the Clerical or Church party, occupied the City of Mexico and the surrounding country. In this state of affairs the interests of American citizens were continually in danger, and Farragut was constantly appealed to for protection.

On the 2d of January, 1859, Minister McLane was advised by the consul at Tampico of an anticipated attack on that place by a portion of Miramon's forces. Accordingly, a boat fully equipped with howitzer, small arms, and provisions was landed under the command of Lieutenant W. N. Jeffers, for the protection of the consulate and American residents. No conflict took place, but Lieutenant Jeffers was fully prepared with his little force to cover the embarkation of any citizens in the event of an attack; and under these circumstances he was instructed not to allow the American flag to be struck.

During all this time the *Brooklyn* was placed at the disposal of Mr. McLane, and conveyed him to different points along the coast, to communicate with our consular representatives. The duty of navigating a vessel of the *Brooklyn's* size along this coast was

hazardous in the extreme; but Farragut's previous service stood him in good stead. And the moral force which the presence of this formidable vessel gave to McLane's negotiations was of great value to the United States. Without it his diplomatic mission could not have obtained a foothold, and the constitutional government of Mexico might never have had its seat in the City of Mexico, or have been recognized by the governments of England, France, Spain, and Germany. The *Brooklyn* returned to the United States with Mr. McLane in September, 1859, but returned again to Mexico in November following, with the minister and his family. Finally, in December, Mr. McLane was taken up the Mississippi and landed at a plantation below New Orleans.

At the beginning of the year 1859 the west coast of Mexico was likewise in a turbulent and revolutionary state. However, the presence of the sloops *St. Mary's* and *Vandalia,* and the steamer *Saranac,* of the Pacific squadron, went far to relieve the fears and preserve the property of our countrymen. While the *St. Mary's* was busy protecting our interests at Guaymas, a detachment of her officers and men was despatched to Mazatlan in a brigantine placed at the disposal of Commander C. H. Davis by the American Surveying Commission. The particular object of this expedition was to obtain information of the condition of affairs around Mazatlan, to learn if any citizens of the United States had been imprisoned there or oppressed, and to afford them all possible relief. This service was performed most satisfactorily by Lieutenant J. S. Maury and the officers and men associated with him. From Guaymas the *St. Mary's* proceeded to Mazatlan, and thence to Acapulco, where she arrived on January 12, 1859. In October of that year, under the command of Commander W. D. Porter, she returned to Guaymas and protested against the oppressive and illegal treatment of a certain Captain Stone and his companions, citizens of the United States, by the authorities of Sonora.

Early in 1860 Miramon made preparations for another campaign against the constitutionalist forces at Vera Cruz. A small squadron under Mexican colors, and commanded by General Marin, was expected to sail from Havana to cooperate in the attack. This squadron was expected off the port about the end of February. President Juarez immediately issued a proclamation declaring it a piratical expedition, and the United States naval

forces received orders from their government to prevent the intended cooperation.

There were lying off Vera Cruz, at this time, besides the steamers *Indianola* and *Wave* (under charter to the Liberal authorities), the United States frigate *Savannah* and the sloops of war *Saratoga* and *Preble*. Marin's squadron, consisting of the steamers *General Miramon* and *Marqués de la Habana*, was descried in the offing early in the afternoon of March 6. By the time they reached the anchorage they were boarded by several of Miramon's officers. Captain J. R. Jarvis, commanding the *Saratoga*, being the senior officer present, sent a lieutenant and eighty men to the *Indianola*, and another officer with an equal number of men to the *Wave*, each officer at once assuming command of the steamer he was on. The *Saratoga*, in tow of the two steamers, then proceeded to the attack; and by midnight Marin's two vessels were prizes of the American naval force. The *General Miramon* made some resistance, and then, in trying to escape, grounded. The *Marqués de la Habana* attempted no defence. The *Saratoga* fired ninety shots, and the casualties on both sides were forty. The prizes were afterwards sent to New Orleans for adjudication.

Captain Jarvis's proceedings were protested against by the commander of the Spanish brig-of-war *Habanero*, who claimed the *Marqués de la Habana* as Spanish property. The commander of the French naval force likewise protested against the *Saratoga's* interference in the affairs of Mexico, calling it an unlawful precedent. But Jarvis's action had been in obedience to the orders of his government to recognize no blockade of Mexican ports by the reactionists, and his course was approved by the President of the United States. The United States district court at New Orleans, however, declared the capture of Marin's ships illegal, and decreed their immediate restoration.

The internal as well as the foreign relations of Mexico became still more complicated in 1861. On the 31st of October a convention was signed in London by Great Britain, France, and Spain, for a joint intervention in Mexican affairs; and toward the end of November diplomatic relations with France and England ceased. The three allied powers were agreed upon the occupation by their forces of Vera Cruz, for the purpose of securing reparation of injuries and damages sustained by their subjects at the hands of the Mexican authorities and the fulfilment of prior obligations

contracted by Mexico with those powers. The United States, having also claims against Mexico, was to be invited to join them; but this country, on receiving the invitation to cooperate with the three powers, declined. The ministers of the three leagued powers were, however, informed that the United States would maintain a competent naval force in the Gulf of Mexico to protect their citizens and interests.

During the years of the Civil War the United States had little opportunity to concern herself with the rapidly developing affairs of Mexico. But with the close of the war in 1865 we were again at liberty to look freely into the French aims and operations in that country, as represented by Maximilian's recently established empire. Notwithstanding the popular pressure, however, in favor of the fulfilment of the Monroe Doctrine to the letter, and the immediate withdrawal of French troops, our government wished by no means to rush into another war. It even endeavored to maintain a strict neutrality toward both of the contending parties, although officials did manage to favor the Republican cause somewhat.

In 1866 an organized squadron was kept in service in the Gulf of Mexico. Commodore John A. Winslow was selected for the command, and entered upon his duties on the 7th of May. The vessels of his squadron patrolled the Gulf and repeatedly visited all the ports on our coast from Key West to the Rio Grande, and occasionally cruised to Tampico and Vera Cruz. Napoleon was beginning to realize that he would have to withdraw his troops from Mexico or prepare for war with the United States. Very shrewdly he proposed to Secretary of State Seward that the French troops would be promptly withdrawn, if the United States would recognize and protect Maximilian as emperor. Mr. Seward's reply, although couched in diplomatic terms, was a point-blank refusal. Our government, moreover, realizing that this produced a crisis in the situation, and might possibly result in war with France, made dispositions accordingly. The steam frigate *Susquehanna,* Commodore James Alden, was placed in commission to convey our Minister to Mexico and Lieutenant General Sherman to Vera Cruz, or such other point as might be required; and troops were mobilized on the Mexican frontier. The Gulf squadron was divided, and a Western Gulf squadron formed to patrol the Mexican coast, under Commodore Winslow.

At this juncture Napoleon determined upon the withdrawal of his army from Mexico. Maximilian, however, after vain appeals and protests, elected to remain. The embarkation of the entire French military and civil establishment was completed at Vera Cruz on the 5th of February, 1867, and the French fleet sailed for France on the 13th of March. The need for a separate United States Gulf squadron thus ceased to exist. Commodore Winslow was directed to haul down his flag and to turn over his squadron to Rear Admiral James S. Palmer, commanding the naval forces on the North Atlantic Station. Nothing, indeed, had occurred to demand an exhibition of our naval prowess; but the presence of this force doubtless produced a salutary effect on the course of events. It may be added that the *Susquehanna* was prevented from landing her passengers, owing to the unsettled condition of affairs in and about Vera Cruz, and was compelled to return to the United States.

Preceding and attending the surrender of Vera Cruz in June, 1867, great judgment and address were exhibited by Commander F. A. Roe, in the gunboat *Tacony*. The ephemeral empire of Maximilian was in its last throes. The City of Vera Cruz was invested by the Republican forces under General Barranda, with whom Commander Roe soon established friendly relations; while in the harbor were men-of-war flying British, French, Spanish, and Austrian colors, patiently waiting for the end. The recognized sympathy of the United States for the Republic of Mexico naturally created a distrust of the Americans, but before long the most perfect understanding between the various commanding officers, including the Austrian, was brought about by the straightforward conduct and tact of Commander Roe. His services were, furthermore, sought by Governor Domingo Bureau, the Imperial commander of the besieged city, for the purpose of arranging terms of capitulation with Barranda.

Early in May, apprehending the speedy capture of the unfortunate Prince, Roe forwarded a letter to President Juarez, urging upon him, in the event of the taking of Maximilian, that he might be pleased, through a spirit of clemency and also of friendship for the United States, to spare his life, should it be in danger. On the fifteenth came the fall of Querétaro and the surrender of the Prince. A day later the news reached the *Tacony*, and Roe at once communicated this information to Captain Aynesley, of H.

M. S. *Jason,* and together they urged Captain Gröller, of the Austrian frigate *Elizabeth,* that as naval aide-de-camp to Maximilian he should go up to the city that night and demand the written authority of Governor Bureau to offer the immediate surrender of Vera Cruz and the Castle of San Juan to General Benavides, on the single condition that the person of the Prince, alive and unharmed, should be delivered on the deck of the *Tacony.* The attempt to save Maximilian was gallantly made, but it was unsuccessful.

A month later it was Roe's sad privilege to carry the news of the cruel execution to Captain Gröller, who begged that Commander Roe would appeal to Juarez to "allow him [Gröller] the privilege of receiving the remains of the late Prince on board the *Elizabeth,* for the purpose of conveying them to Vienna." This request was acceded to at once by Roe, and in the letter of transmittal, Roe added, "As I conceive his [Gröller's] prayer to be one of tender humanity and affection for his unhappy and bereaved family, I have the honor to beg also that his request may be granted." However, no reply was received from the authorities. Gröller, who had been the last to greet Roe on his arrival, wrote as he was leaving Vera Cruz: "I shall never forget you nor your exquisite kindness towards me, and your noble feelings in the disastrous days of Maximilian's murder."

Negotiations for the surrender of Vera Cruz were resumed, when the unexpected arrival of the notorious agitator Santa Anna, on board the American mail steamer *Virginia,* occurred. Santa Anna's position was a peculiar one. He was on board of an American ship, under the flag of the United States, in a port besieged by the Government of Mexico, declaring and fomenting the civil war against that government, with which the United States were on friendly relations, and acting under an assumed authority from the United States. Claiming the protection and shield of the American flag, he prevented the act of surrender of Vera Cruz after the terms of that surrender had been agreed to and accepted by both parties; and this under the declaration that he was acting under the authority of the United States. Bureau, the Imperial governor, fled, and the chief command of Vera Cruz devolved upon General Gomez, who called the captains together and announced that he had come to offer up the town to the body of consuls, requesting that they form a provisional government;

and turning to Commander Roe, he said that to him he would surrender the Castle of San Juan de Ulloa. The arrangements were soon made, and on June 27, 1867, the Liberal army marched in and took possession of Vera Cruz and its fortifications. Mexico was now again entirely under her own flag. On July 24 the *Tacony* left Vera Cruz for Pensacola. The Secretary of the Navy approved Commander Roe's course in the following terms: "The department embraces the opportunity of conveying to you its approbation of the manner in which you have discharged the responsible and delicate duties which have devolved upon you as the commanding American naval officer off Vera Cruz at an interesting and eventful period, when important occurrences were transpiring and decisive and correct action were required."

In June, 1868, a display of naval force in the Gulf was again considered necessary in consequence of reports that a hostile expedition against Mexico was concentrating near New Orleans. No occasion for action, however, manifested itself, and the vessels were consequently withdrawn.

In May, 1870, the *Mohican*, Commander W. W. Low, attached to the Pacific fleet, left San Francisco on her way to join the South Pacific squadron, and touched at Mazatlan. There she learned of the piratical movements and proceedings of the steamer *Forward*. This vessel, formerly a gunboat in the British Navy, had sailed from San Francisco for the coast of Mexico a short time before, ostensibly to engage in the oyster and fishing trade. Soon after her arrival on the coast she was seized by an armed party who professed to be acting under the orders of a Mexican named Placido Vega, who was formerly Governor of Sinaloa, but who then held no office under the Mexican Government. A raid was made upon Guaymas, and much property was seized there by forced contributions from foreign merchants. An attempt was also made to capture a *conducta* crossing from the interior to the coast, but it was unsuccessful. In consequence of these acts, trade had become paralyzed on the coast, and the merchants felt themselves at the mercy of the freebooters. Vega, moreover, signed his orders to this party as General Commanding the State of Sinaloa. He had, however, issued no pronunciamento, nor was any revolution in progress. The *Forward* flew the flag of San Salvador all the time, although that state was then at peace with Mexico.

Upon the arrival of the *Mohican* at Mazatlan, Commander Low was earnestly requested by the Mexican authorities to capture the *Forward*. After deliberating upon the subject, he became convinced that it was his duty to seize the ship as a piratical vessel. Learning that she was in the Teacapan River, he despatched a force of seventy-nine men, in six boats, under the command of Lieutenant W. H. Brownson, on the morning of the 17th of June. After pulling about forty miles, they discovered the *Forward* at anchor, and immediately boarded her. Only seven men were found on board, and these were made prisoners. The vessel's guns were also found to have been mounted in a battery on shore. In pursuing a boat which was seen to be pulling away from the *Forward*, Ensign J. M. Wainwright fired into her when she refused to stop, and the battery on shore at once returned the fire with grape and shrapnel, killing the coxswain, and wounding Ensign Wainwright and two men. The fire from the shore was then directed upon the *Forward*, but the high bulwarks of the vessel forward protected the *Mohican's* men to a great extent. Only four men were thus wounded. Lieutenant Brownson thereupon withdrew with his party, having first set the *Forward*, which was aground in five feet of water, on fire. The party reached the *Mohican* about two o'clock in the afternoon of the 18th of June.

The promptness of Commander Low in this instance again forestalled the action of the British naval commander in those waters, who had also issued orders for the capture of the *Forward*. It is said that he remarked to the American commander at the time, alluding to the affair, "This is always the way with you American Navy officers; you are ahead of us when a ship-of-war is required to be on the spot." The sole cause of regret connected with the affair were the casualties from the fire of the pirates. Ensign Wainwright died shortly after returning to the *Mohican;* James Donnell, coxswain, was killed; and six other brave men had been wounded. The prisoners, six in number (one having escaped), were delivered by Commander Low to the Mexican authorities.

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

WHAT WE CAN DO

By Lieutenant (Junior Grade) R. T. Merrill, 2d, U. S. Navy

We of the service are greatly interested in the present widespread newspaper discussion as to the preparedness or lack of preparedness of the navy. We sit smugly back and think: "Ah, at last they are beginning to appreciate us and to do something for us;" the "something" in question being more battleships, an increase of men, or a personnel bill.

There seems to be little doubt that the coming session of Congress will appropriate more money for the navy than has ever been given us in a single year. The reason is that public interest throughout the country is awakening to the value of naval strength. On ourselves it devolves to maintain and intelligently to direct this public interest that it may not expire when the cause for it has been decided.

Appropriations in the past have been hard to get and when obtained have not always been spent to best advantage, owing to the prevalent belief that the navy was the plaything of the sea coast. To the Middle Westerner the idea that a navy protected *him* was laughable. He knew that no ships could shoot that far nor could troops get across the ocean. As a means of keeping shells out of New Englanders' front yards a navy was all very well and he didn't mind paying a little—not too much—towards such a cause, but the very name—weren't our ships all "coast defense ironclads"?—showed their real use and object.

Then came the Spanish War. For a brief moment the navy was in the lime-light. Naval battles were fought in which the enemy were invariably beaten by our fleets, to the intense satisfaction of Mr. Average American, whom tables of comparative strength and percentage of hits bothered not a whit. In this favorable moment

a personnel bill was passed and the first steps towards a real sea-keeping navy were begun.

The war over, back went the navy to the shadows, not again to stand forth in the minds of the whole people, in spite of world cruises and fleet reviews, for fifteen years. During that time the inlander probably knew that we had a navy of sorts, but that was as far as his knowledge went. Occasionally he read of the trials of a new ship, always represented in the papers to be the largest, finest and fastest afloat. If he thought of the navy at all it was as a sort of genus hydra, reproducing itself without attention on anyone's part. Mr. Average American hadn't the slightest idea whether his Congressman had voted for two battleships or none, but he knew who got the new post office, you bet.

Finally the great war-cloud burst over Europe; a titanic struggle of highly civilized nations armed with the most deadly weapons. As a result of this war two schools of thought developed in the United States.

The first includes a number of people who, from experience or from hearsay, are so deeply affected by the horrors of war that they consider no sacrifice too great to avoid it, and who consider that passivity is the only means of avoiding it.

The other class includes the arm-chair strategists who, from the news published in their daily papers, have already decided upon the exact type of craft which is to settle future wars. By these authorities the battleship is as extinct as the dodo and to save the country we should bend all our energies towards building aeroplanes, or battle cruisers, or submarines or Zeppelins or whatever is the hobby of that particular individual.

Between these two schools the naval legislation must be guided. The people at large are indifferent only through ignorance, and if the lesson of unpreparedness is not to be learned by bitter, bitter experience it must be systematically taught by those qualified to do so.

Right here is the navy's golden opportunity. We have the means at hand to give this instruction, without the slightest cost to the government.

Scattered throughout the country are twenty-seven recruiting offices, each with at least one commissioned officer in charge, and with a clerical force of assistants. Suppose that the entire country

were divided into twenty-seven geographical districts, each having the town wherein is the recruiting office for its focus.

In each of these districts let there be sent to every college, school board, chamber of commerce, town countil, lyceum and well-established public organization a letter something on the following order:

> The naval recruiting officer, Lieutenant X, U. S. Navy, having his headquarters in the town of Blank, holds himself in readiness, subject to service exigencies and to prior engagements, to address your organization on the subject of The United States Navy. The only cost incurred will be Lieutenant X's expenses while fulfilling the engagement. Should it be desired and you be willing to meet the additional expense of operators and handling, Lieutenant X will illustrate his lecture with moving pictures. Address all applications to Lieutenant X direct.
>
> (Signed) THE SECRETARY OF THE NAVY.

In the meantime lectures are prepared by the officers best fitted for the task, to suit varying conditions and audiences. For example, before a board of trade the lecture could show the connection between navy and merchant marine, and its effect on freight rates and insurance as well as of securing a market for selling goods. Before a woman's meeting the real value of a navy in preventing invasion and its concomitant horrors might be brought out, while for a camp of boy scouts the scientific and technical side would probably prove more interesting. The lecturing officer, of course, would not be limited to the stock lectures but could deliver original talks, previously scrutinized by the department, should he feel that special circumstances require it.

In ordering officers for this publicity duty—and it would probably soon become sufficiently onerous to require separation from the recruiting branch—the department would seek good "mixers," easy, fluent talkers and in general the same characteristics which make a successful salesman.

The officer himself should cultivate as wide a circle of acquaintances as possible, should talk navy in season and out, and should keep on the good side of all the small-town newspapers. It may sound incredible but there are numbers of people who take a lively interest in naval affairs merely through knowing one officer in the service.

If this publicity campaign is carried out, if the officers upon whom the duty devolves study their ground and know their district

thoroughly, if good, authentic films of the interesting points of navy life are shown, and if the lectures are written, selected, and delivered with care, we will in a very few years have a potent, and for the first time intelligent, public opinion directing the men who vote the appropriations.

DISCUSSION

Can the Graduation of the Compass into Points be Dispensed With?

(See Page 1659, Whole No. 154, and 515, Whole No. 156)

Rear Admiral Seaton Schroeder, U. S. Navy.—As an addition of possible interest to the discussion of the advisability of abandoning the present unit of graduation of compass cards, I quote here a letter which I addressed to the Navy Department in February, 1914. I was not aware, at the time, of Professor Maurer's paper which had appeared in the *Marine Rundschau* of July, 1912, but which did not come to my notice until I saw the translation of it in the Institute Proceedings of November-December, 1914. It is a matter that seems worthy of consideration.

Navy Department,
February 28, 1914.

From: Rear Admiral Seaton Schroeder, U. S. N. Retired.
To: Secretary of the Navy (Bureau of Navigation).
Subject: Suggests a change in marking compass cards.

1. I respectfully suggest that consideration be given to altering the marking of the navy compass cards for both magnetic and gyro compasses and peloruses so as to effect a sub-division of the quadrants into a new series of sectors of 15 degrees each in place of the present illogical "points" of 11¼°; each of the proposed new sectors to have also a name as at present.

2. In the working out of details in the recent reconstruction of the Naval Tactics and signal system of the navy I became confirmed in the opinion, formed while with the fleet, that in the changes of direction in battle approach and of relative bearings, small changes are not needed, and the unit of 15° was finally arrived at for . . . . maneuvers instead of one degree as heretofore. . . . . This virtually creates a new unit for battle conditions, and one which is also perfectly applicable to ordinary conditions of navigation; and it is surely logical to assimilate as closely as possible all methods liable to be applied under the varying conditions. Incidentally convenience will be promoted by having a name for that unit, and by having names for the multiples of that unit contained in the individual quadrants.

3. In increasing the size of the unit of angular measure to meet the conditions of battle approach and of battle, the old "point" of 11° 15′ could have been used; but that is open to the objection that those points contain a fraction of a degree, whereas no course is given nearer than one degree. Of the 32 points, none except the eight cardinal and inter-cardinal

points corresponds with any number of whole degrees, and the inconvenience of this incongruity has been increasingly apparent since the practice was adopted of naming courses by degrees from zero at North around through East and South and West to 360° at North again. A 15° subdivision gives a full unit at each cardinal and inter-cardinal point as at present, but will require new markings through the half quadrants.

4. This is a matter entirely and solely of convenience; but it is a convenience that is often material. For instance, it is observed that in the reports of battle and other exercises such statements are frequently seen as that "the course was 112°, with the wind fresh from NNE. on the port beam," etc.; in the log books one reads that there was "a moderate swell from SSW.," etc. This displays the intuitive desire, amounting almost to a necessity, to use a terminology by which a more or less general direction can be indicated when a precise direction is neither desired nor practicable. This will undoubtedly lead to a retention of points of the compass for certain purposes.

5. There must, of course, be some major subdivision marked on the compass card to help the steersman to keep his course; with nothing but degrees marked he could easily get 5° or 10° off without at first noticing it. In the days of sailing ships, frequently beating to windward, no steering was attempted closer than the quarter point; but now there seems to be no good reason for retaining a "point" of 11¼°, as a course is not given nor steered by those points and they constitute a broad subdivision which catches the eye but of which the essential feature is that they do not tally with any course except at the cardinal and inter-cardinal points. It is surely more rational to have those larger subdivisions so proportioned as not only to always tally with a whole degree of arc but also to tally with increments of 5°, which is the natural graduation universally used. This seems a logical moment to consider the change.

6. As requirements and implements progress, methods should keep in touch. There is nothing in this proposed plan that can materially antagonize any professional opinion or practice. One objection that may be urged is to the effect that the navy compass cards should not differ from those of the mercantile marine; but the consideration should be reversed to the end that the compass cards of the mercantile marine would better agree with those of the navy. There would be no difficulty on that score. Nautical instrument makers would soon effect the change, which, after all, is small and easily effected. In any event the officers and men of the naval militia, who would come to the navy in time of need, would have been trained with the compasses used by the navy.

7. A second objection that may be urged will require more consideration, and that is that the magnetic roses on charts should then be changed. This, however, is not an insuperable objection; the true compass rose is graduated in degrees on all except a few older charts, and the interior *magnetic* roses could gradually be changed. My impression is that all navy navigators now work out true courses, and that many in the mercantile marine do the same.

8. It would seem advisable to adopt a new term for the proposed new unit in order to prevent any confusion with the present "points" during the brief transition period. The term "sector" would be suitable, the only objection being that it is differently used in search-light work; but that objection applies only in the navy and not at all tangibly there.

9. I subjoin a tentative nomenclature of compass directions by sectors:

0° North	90° East	180° South	270° West
15 N by E	105 E by S	195 S by W	285 W by N
30 NE by N	120 SE by E	210 SW by S	300 NW by W
45 NE	135 SE	225 SW	315 NW
60 NE by E	150 SE by S	240 SW by W	330 NW by N
75 E by N	165 S by E	255 W by S	345 N by W

A Plea for the Battle Cruiser

(SEE PAGE 1897 OF THIS NUMBER)

THE QUESTION OF GUN POWER AND SPEED

MR. T. G. FROTHINGHAM.—Our best defense is our navy, and the strength of that defense is our battle fleet. Fortunately the policy of our navy has given us a heavily armored battle fleet with superiority in guns. As Admiral Goodrich says in his valuable article in the *North American Review*, "It is the gun, and the gun alone, which has determined the issue in naval battles." Other navies have been led astray by the craze for speed. In the American Navy the gun has been the main thing. All the lessons of the war have vindicated this policy, and we have a consistent battle fleet that can command our seas. We must maintain a program of ship-building that will probably increase this battle fleet, and retain its superiority in guns. So far this program has been consistent, and we must not let any fashion for speed interfere with our main object—the heavily armed fleet of battleships. Everything else should be made auxiliary.

It is probably fortunate that our navy has not followed the latest fashion for battle cruisers. It was assumed that they would take their place in the battle line—and do everything else besides! The war has already shown the vulnerability of this class of ships, and they are not now really considered strong enough for the battle line. Their tactical value is still urged, especially by British experts, who have to justify the vast amounts spent on them.

The second battle in the Pacific was won by a long distance concentration of such ships against an inferior fleet. After all, the first battle was won by the Germans in the same way with no battle cruisers. In each action a complacent commander was sailing about in a fleet that he believed too strong to be attacked. The German concentration was as successful as the British, and giving battle was the mistake, in each case, of the commander of the weaker fleet.

The chase in the North Sea is the outstanding test of the tactical value of the battle cruiser. "On paper" the British squadron of battle cruisers started after an enemy squadron so inferior that it should have been practically destroyed, with no damage to the British ships. In fact one

slower inferior German cruiser was destroyed, and the best British battle cruiser, the *Lion*, was so badly damaged by shot in her vulnerable forward part, that she had to be towed in, with a list and badly down by the bow. Another of the battle cruisers was similarly injured, and came back with her engines reduced in power. If the German submarines had been active, as later in the war, they would have been able to destroy the two battle cruisers and the ship towing the *Lion*. Why is it sensible to build $20,000,000 units of doubtful value at the expense of our battle fleet?

Our navy needs ships of great speed as auxiliaries of our battle fleet. By discarding the weight of armor (which is useless if not of the heaviest type) extreme speed is possible. A class of such ships could be built in a comparatively short time, each to carry two, or possibly four, of our most powerful naval guns. These ships would have greater speed than any battle cruiser, with guns of superior range and power. We would gain several efficient cruisers for the cost of one battle cruiser. These cruisers would be more useful as screen, scouts, raiders, or commerce destroyers. They would lessen the tactical value of the enemy battle cruiser, as a concentration of such ships against a battle cruiser would be serious. If we spend a great deal of money on a few battle cruisers, we are adopting the game of the other navies, with fewer pieces on account of our late start. Using such cruisers as I have described, with our consistent heavily armed battle fleet, we would introduce a new element in tactics which would neutralize the battle cruisers in other navies.

As I said before, the battle cruiser is no longer considered a "dreadnaught" in the sense of being a battleship. Its utility is to take the sea, trust to its speed, to raid and destroy commerce. A superior number of enemy battle cruisers minimizes this value. A class of ships of extreme speed, with heavy guns, could keep the sea in spite of any number of enemy battle cruisers. Nothing could catch them that they would not blow out of the water. Besides this value as raiders, commerce destroyers and scouts, the constant threat of a concentration against enemy battle cruisers would greatly limit the enemy's use of battle cruisers. The logical auxiliary of a heavily armed battle fleet is to have the fastest thing afloat also heavily armed.

U. S. NAVAL INSTITUTE

SECRETARY'S NOTES

Annual Dues

The annual dues for 1916 become payable on January 1, 1916. There is no change in dues on account of bi-monthly publication. It is suggested that dues be paid in lump sums covering a period of two to five years; this method of payment has advantages for members as well as for the Institute and is practiced by a number of members, both regular and associate. Response to this notice will save the Institute a considerable sum in stationery and postage. Beginning January 1, 1916, members residing abroad permanently or for any length of time will be charged postage at the rate of fifty cents a year.

Special Notice

It is believed that the scope of usefulness of the PROCEEDINGS to members of the Institute can be increased and all members are invited to assist in this work. Should any topic occur to you on which you think an article could well be written, or on which you would like to read one, send such topic to the Secretary and Treasurer, together with such explanation or comment as may appear desirable in order that the intent of the suggestion may be clearly understood. The Institute is desirous of obtaining good "sea yarns" for publication. It is hoped that anyone who can spin such a yarn will submit it.

References

Attention is invited to the following articles which have appeared in the pages of the PROCEEDINGS during the past two years; they treat of subjects which closely concern Naval War College work; a perusal of them should prove profitable:

1913

Trained Initiative and Unity of Action: The True Bases of Military Efficiency. By Lieutenant Commander D. W. Knox, U. S. N.; page 41, Whole No. 145, March, 1913.

Logistics: Its Bearing on the Art of War. By Commander C. T. Vogelgesang, U. S. N.; page 63, Whole No. 145, March, 1913.

Column as a Battle Formation. By Lieut. Commander D. W. Knox. U. S. N.; page 949, Whole No. 147, September, 1913.

The Naval War College, the General Board and the Office of Naval Intelligence. By Commander W. S. Crosley, U. S. N.; page 965, Whole No. 147, September, 1913.

Scouting and Screening Operations. By Lieut. Commander W. S. Pye, U. S. N.; page 1139, Whole No. 147, September, 1913.

Organization of the Fleet for War. By Lieutenant R. E. Ingersoll, U. S. N.; page 1739, Whole No. 148, December, 1913.

1914

War and Policy. By Captain J. S. McKean, U. S. N.; page 1, Whole No. 149, June, 1914.

Moral Training in Preparation for War. By Charles M. Bakewell; page 157, Whole No. 149, January, 1914.

The Great Lesson from Nelson for To-day. By Lieut. Commander D. W. Knox, U. S. N., P. E., page 295, Whole No. 150.

Naval Policy as it Relates to the Shore Establishment and the Maintenance of the Fleet. By Captain John Hood, U. S. N., H. M., 1914; page 319, Whole No. 150, March, 1914.

Details of Navy Department Administration: Navy Department Policies. By Lieut. Commander N. L. Jones, U. S. N.; page 377, Whole No. 150, March, 1914.

Military Preparedness. By Naval Constructor Richard Gatewood, U. S. N., H. M., 1914; page 631, Whole No. 151, May, 1914.

What Should be the Relations Between Battle and Reserve Fleets. By Captain W. S. Sims, U. S. N.; page 727, Whole No. 151, May, 1914.

Old Principles and Modern Applications. By Dudley W. Knox, U. S. N., H. M., 1914; page 1009, Whole No. 152, July, 1914.

The Battle of the Sea of Japan: Translation Japanese General Staff Report. By Captain W. T. Hoadley, U. S. Marine Corps; page 961, Whole No. 152, July, 1914.

Some Foreign and Other Views of War and the Study and Conduct of War. By Captain Albert Gleaves, U. S. N.; page 1301, Whole No. 153, September, 1914.

Strategic Problems and Their Solution. By Captain R. von Labres, I. G. N. Translated by Surgeon J. F. Leys, U. S. N.; page 1409, Whole No. 153, September, 1914.

Bureau of Information

The Institute offers its services as a "Bureau of Information" on professional questions and will endeavor to obtain replies from the best qualified sources. Those "Questions and Answers" which are suitable for purposes of general information, will appear in the PROCEEDINGS. It is suggested that knotty questions which come up in professional examinations for promotion may well be submitted to this department.

Membership

Since September 20, 1915, 41 regular and 6 associate members have joined the Institute. 1 member resigned. The following member has died:

Rear Admiral H. N. Manney, U. S. Navy, Retired.

The need for more members continues; bi-monthly publication should make the PROCEEDINGS more than ever valuable and necessary in keeping up with the naval profession; all members are asked to help in increasing the membership.

Notice

Whole Nos. 145 and 149 of the PROCEEDINGS (March, 1913, and Jan.-Feb., 1914) are exhausted; there are so many calls for single copies of these numbers that the Institute offers to pay for copies thereof returned in good condition at the rate of 25 cents per copy.

Address of Members

Members, especially those on the retired list, and civilians are urged to keep the Secretary and Treasurer informed of the address to which PROCEEDINGS are to be sent, and thus insure their receipt.

Book Department

The Institute Book Department will supply any obtainable book, of any kind, at retail price, postage prepaid. The trouble saved the purchaser through having one source of supply for all books, should be considered. The cost will not be greater and sometimes less than when obtained from dealers. Bills will be rendered upon delivery of books.

Non-receipt of Proceedings

Members and subscribers are urged to notify the Secretary and Treasurer promptly of the non-receipt of PROCEEDINGS, in order that tracers may be started. The issue is completed by the 10th of the even numbered month.

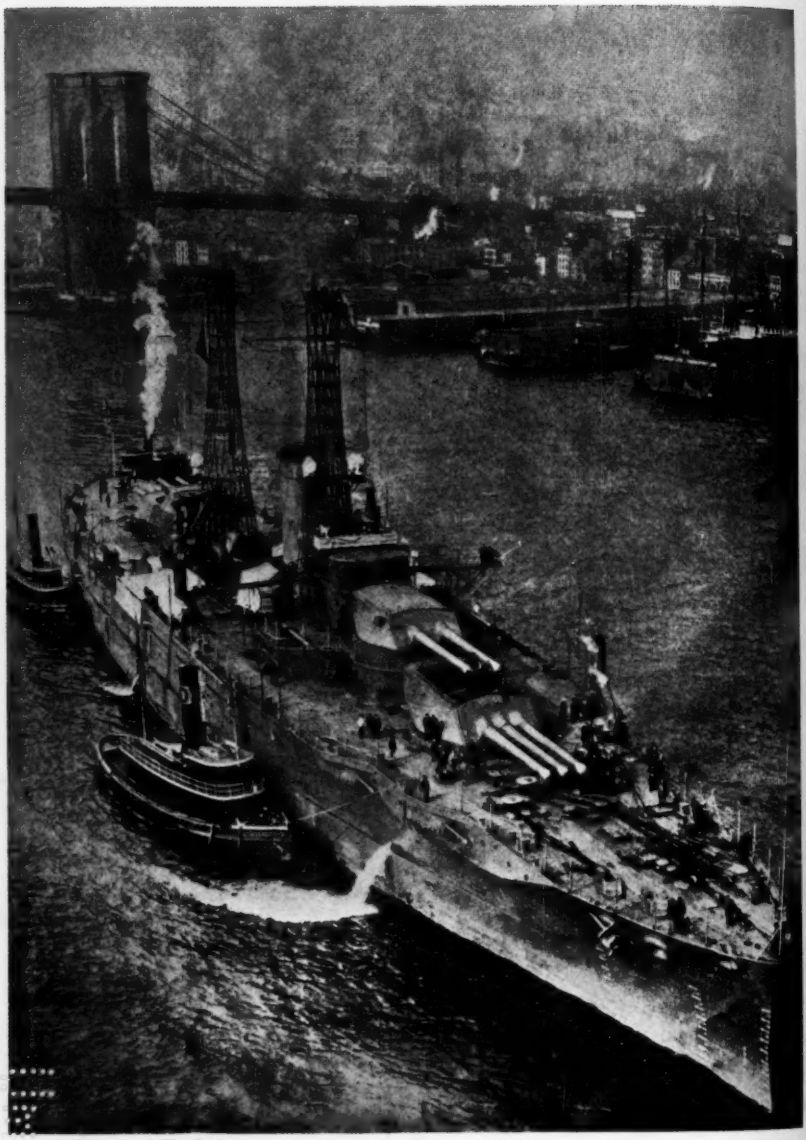
Reprints of articles

The attention of authors of articles is called to the fact that the cost to them of reprints other than the usual number furnished, can be greatly reduced if the reprints are struck off while the article is in press. They are requested to notify the Secretary and Treasurer of the number of reprints desired when the article is submitted.

Change of the Board of Control

At a meeting of the Board of Control, held October 9, 1915, Commander Ralph Earle, U. S. Navy, was elected a member of the Board, vice Captain L. H. Chandler, U. S. Navy, resigned upon detachment, and on November 13, 1915, Lieutenant Byron McCandless, U. S. Navy, was elected vice Commander J. T. Tompkins, U. S. Navy, resigned upon detachment.

ANNAPOLIS, MD., November 16, 1915.



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PROFESSIONAL NOTES

Prepared by LIEUTENANT C. C. GILL, U. S. Navy

GENERAL ARRANGEMENT

NAVAL POWERS: PAGE

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NAVAL POWERS

ARGENTINE REPUBLIC

VESSELS BUILDING

Name	Displacement	Speed	Armament	Builders	Remarks
Battleships					
Rivadavia.....	27,940	22.5	12 12-in., 12 6-in., 16 4-in.	Fore River Co.	Completed
Moreno.....	27,940	22.5	same	New York Co.	Completed

NOTE.—Argentine has four destroyers, displacement 950 tons, contracted for (two built at Nantes and two at Bordeaux), launched in 1911 but not yet turned over to the government. Also four additional destroyers of about 950 tons to replace those sold to Greece, building at Krupp's Germania Works. (It is presumed that these destroyers have been taken over by France and Germany respectively, as war measures.)

AUSTRIA

VESSELS BUILDING

Name	Displacement	Speed	Armament	Builders	Remarks
Battleships					
Prinz Eugen..	20,010	20	12 12-in., 12 5.9-in., 18 12-pdrs.	Trieste	Commissioned
Szent Istvan..	20,010	20	same	Fiume	Launched Jan. 17, 1914
Ersatz Mon'ch	24,500	22½	10 14-in.	Trieste	To be laid down, 1914
" Budapest	24,500	22½	same	"	" " " " 1914
" Wien....	24,500	22½	same	Fiume	" " " " 1914
" Hapsburg	24,500	22½	same	Trieste	" " " " 1915
Small Cruisers					
Saida.....	3,454	27	9 4.1-in., 2 6-pdrs.	Monfalcone	Trials Apr., 1914
Helgoland	3,454	27	same	Fiume	Launched Nov. 23, 1912
Novara.....	3,454	27	same	"	" Feb. 15, 1913

NOTE.—Three destroyers launched in 1913, displacement 787 tons, nearing completion. Two submarines, displacement 550 tons, and three of 860 tons, contracted for in 1912 are to be built by Krupp Co. There are also 27 torpedo-boats of 250 tons displacement in various stages of construction. In lieu of definite information regarding progress in ship construction since outbreak of war conjectures may be based on dates in column headed "Remarks."

CHINA

VESSELS BUILDING

Name	Displacement	Speed	Armament	Builders	Remarks
Light Cruisers					
Fei-Hung	2,600	22½	2 6-in., 4 4-in., 2 3-in., 6 3-pdrs.	N. Y. Ship Bldg. Co.	Sold to Greece
.....	4,800	27	.....	Monfalcone	Ordered Nov., 1913
.....	1,800	24	.....	"	Contracted for Sept., 1913
.....	1,800	24	.....	"	same
.....	1,800	24	.....	"	same

NOTE.—Four destroyers, displacement 400 tons, are building, one at Trieste and three at Schichau. The three Schichau boats have been delivered.

DENMARK

VESSELS BUILDING

Name	Displacement	Speed	Armament	Builders	Remarks
Niels Juel.....	3,675	16	2 9.4-in., 4 5.9-in.	Copenhagen	Laid down Sept., 1913

NOTE.—Three destroyers are under construction at Copenhagen and three submarines, displacement 200 tons, are being built by Whitehead Co. (The submarines have probably been taken over by England.)

FRANCE

VESSELS BUILDING

Name	Displacement	Speed	Armament	Builders	Remarks
Battleships					
France	23,092	20	12 12-in., 22 5.5-in.	St. Nazaire	Commissioned
Paris.....	23,092	20	same	La Seyne	"
Bretagne.....	23,172	20	10 13.4-in., 22 5.5-in.	Brest	Launched April 21, 1913
Provence.....	23,172	20	same	Lorient	" April 20, 1913
Lorraine	23,600	20	same	St. Nazaire	" Sept. 30, 1913
Languedoc	24,828	21.5	12 13.4-in., 24 5.5-in.	La Seyne	Laid down April 28, 1913
Normandie....	24,828	21.5	same	St. Nazaire	" July 5, 1913
Flandres.....	24,828	21.5	same	Brest	" Oct. 10, 1913
Gascogne.....	24,828	21.5	same	Lorient	" Oct. 1, 1913
Bearn	24,828	21.5	same	La Seyne	Contract Jan. 7, 1914

NOTE.—There are approximately six destroyers and 23 submarines under construction. (Lack of information since outbreak of war has made it impossible to correct table to date.)

USEFULNESS OF OLD WARSHIPS.—There has been of late, according to the official publication of the Minister of Marine, a well-deserved shower of distinctions and commendations on the personnel of obselete and worn-out ships that have found in the Dardanelles and Levant a splendid utilization of their heretofore untried capabilities. Prominent among these is the 12,000-ton *Jauréguiberry* (1893), which has been repeatedly commended both for the excellence of her gunnery and her all-round efficiency. This contemporary to the British *Royal Sovereigns* has outlived many ships of later design, such as the *Valmy, Jemmapes, Tréhouart, Charles Martel,* and *Masséna,* all of which were poor seaboats, and had their belts submerged when at full load. She was built at La Seyne, and belonged to the famous *Pelayo, Capitan Prat,* and *Cesarewitch* series, being in her time much admired by British experts, who praised her high freeboard, nautical qualities, and the remarkable command and arc of fire of her artillery, and found also something to say in favor of the end-on-fire theory embodied in her design. She owes her long and useful career to her excellent construction.—*Naval and Military Record,* 15/9.

ADMIRAL BOUÉ DE LAPEYRÈRE RETIRES OWING TO ILL-HEALTH.—We have to regret the resignation of a good and capable seaman of the Allies, Admiral Boué de Lapeyrère, the French commander-in-chief. He has asked to be relieved of his command after 14 months diligent and zealous service, and Vice Admiral D'Artige du Fournet has been appointed to succeed him. The retiring admiral is held in the highest esteem not only by the *personnel* of his own fleet, but by the many persons in other navies who know the value of the work he has done for France both as a commander

and administrator. During the time he served as Minister of Marine he showed exceptional talent for organization and keenness and determination along the path of progress, laying the foundation for that Renaissance of the French fleet which was a striking factor in European politics when war began. It was he who introduced the organic law for the navy and other measures of far-reaching importance, and as one of his colleagues at the Ministry of Marine said, he was "not only a chief, but a great chief, upon whom the country could place the highest hopes." His selection to command the Allied naval forces in the Mediterranean was universally popular, and the regret at his departure will be both sincere and widespread.—*Army and Navy Gazette,* 16/10.

NEW FRENCH NAVAL CHIEF.—The following French official statement was issued yesterday in London:

Vice Admiral Bouè de Lapeyrère, commander-in-chief of our naval forces, being seriously ill, has asked the Minister of Marine to relieve him of his command. On the proposal of M. Augagneur, Vice Admiral D'Artige du Fournet has been appointed to take Admiral Boué de Lapeyrère's place at the head of our naval forces.

In the course of the present war Admiral d'Artige du Fournet commanded the Syrian squadron, and subsequently the Dardanelles squadron, and has given fresh evidence in these two positions of his high service qualifications, both as sailor and commander.

Contre Admiral Guêpratte, commander of the complementary division of the naval forces in the Dardnelles, is promoted to the rank of vice admiral. —*Naval and Military Record,* 13/10.

GERMANY

VESSELS BUILDING

Name	Displacement	Speed	Armament	Builders	Remarks
Battleships					
Grosser Kurfürst	26,575	23	10 12-in., 14 5.9-in., 12 3.4-in.	Hamburg	Commissioned
Markgraf	26,575	23	same	Bremen	"
König	26,575	23	same	Wilhelmshaven	"
Kronprinz	26,575	23	same	Germania	Launched Feb. 21, 1914
Ersatz Worth	29,000	....	8 15-in., 16 5.9-in.	Kiel	Laid down Sept., 1913
"T" 1913	29,000	....	same	"	" May, 1913
Ersatz Friedrich III	30,000	....	8 15-in., 18 5.9-in.	....	" summer 1914
Cruisers of the Line					
Lützow	28,000	28.5	8 12-in., 14 6-in.	Dantzig	Launched Nov. 20, 1913
Derfflinger	26,500	28.5	same	Hamburg (Blohm & Voss)	Commissioned
Ersatz Hertha	28,000	28.5	8 12-in.	Wilhelmshaven	Laid down July, 1913
Ersatz Victoria Louise	.....	....	....	....	" summer 1914
Protected Cruisers					
Karlsruhe	4,900	28	12 4.1-in., 2 t. t.	Germania	Commissioned
Rostock	4,900	28	same	Howaldt	"
Regensburg	4,900	27.5	12 4.1-in.	Bremen	"
Graudenz	4,900	27.5	12 14.1-in.	Kiel	"
Ersatz Hela	5,500	27.5	10 6-in.	"	Laid down fall 1913
Ersatz Gefion	5,500	27.5	same	Stettin	" "
Ersatz Niobe	.....	....	....	....	" summer 1914
Ersatz Gazelle	.....	....	....	....	same

NOTE.—Germany has twelve destroyers and twelve or more submarines under construction. Tonnage of ships building uncertain. Changes in construction program because of war are problematical.

RUMOR OF AN UNSINKABLE BATTLESHIP.—Submarines and Zeppelins having failed of their purposes, the German Admiralty is now pinning its faith to an unsinkable battleship now building secretly at one of the German naval plants. So far as is permitted us to speak, the plans of this new superdreadnought which is expected to put all battleships of the 1915 or earlier types into the second class, provide for three outer bottoms, the first being eight inches thick, the second four inches thick, and the third or inner bottom one-half inch thick. Between these three skins are spaces of varying dimensions filled with a secret composition which offers no resistance to the explosive powers of shell or torpedo. It is confidently predicted by modern German ordnance experts that no projectile in present use will ever penetrate the inner skin of this ship, as its shattering power will be spent in its action against the non-resisting composition between the first and second skins of the ship.

The non-sinkable battleship is not new in theory, though naval constructors have been very chary of giving the theory practical support. So far as is known, Germany is the first nation to actually begin to build such a type, while our own Navy Department has actually under advisement at the present moment a plan for the building of an unsinkable ship.

If this type of vessel should prove a success, it will mean a revolutionary change in the existing theories of naval ordnance, all guns and shells in present use being based upon the sole idea of great penetration against an object offering tremendous resistance. The unsinkable battleship by offering little or no resistance to the shell or torpedo has the effect of choking its rending force after the explosion has taken place, and before it has penetrated into the actual vitals of the ship. The only effective ordnance against this ship of the future will have to possess longer range, less weight, and higher explosive capacity, while penetrating power will tend to become of secondary value. A little analysis of the law of kinetics might be illuminating to the experts who believe that the only way to fight one force is by offering force of equal or greater resistance to the impact—*Seven Seas,* November.

THE NUMBER OF GERMAN SUBMARINES.—A German naval officer is authority for the statement that 60 submarines have been put in hand in German and Belgian yards since the outbreak of the war. Of these 24 are of about 250 tons displacement; 12 of about 800 tons; and 24 of about 1200 tons. According to this authority, over one-half have been passed into service and this, at the time the statement was made, gives an average rate of completion of about two boats every three weeks. At the present rate of construction it would seem from these figures that the German statement of their putting out one boat a week may be correct.—*Scientific American,* 16/10.

SUBMARINE MINE-LAYERS.—It is revealed that the Germans have completed some mine-laying submarines. According to Mr. Archibald Hurd, writing in *The Daily Telegraph,* ships of this class are now busily engaged in trying to destroy our own and neutral ships. These new German submarines have a specially constructed air-tight chamber into which the mines are placed ready to be sown. The mines are rather smaller than those

hitherto used, but they are sufficiently destructive nevertheless. When the preparations have been completed, and the submarine has reached the desired spot, the air and water-tight doors from the hull of the submarine leading to the chamber is shut, and another trap-door is opened flooding the chamber. The mines by mechanical means are then released. In this manner an area of water can be rendered perilous to shipping. Only chance will reveal the lurking danger. Each mine, when it is put into the chamber, rests on a series of "fingers" of steel, which may be compared to the fingers of the human hand; a hawser is fixed at one end to the mine and at the other to the base of the "fingers"—which is in the relation of the wrist to the hand. The mine goes down in the water with the ingeniously constructed "sinker," as it is called. As it descends a mechanism is set in motion, and the mine, which is much lighter than the water, is released from the "fingers" and rises to the surface. Meantime the "sinker" turns over, with the fingers pointing downwards; it thus reaches the bottom of the channel. The mine is set like a time-fuse shell, and when it has attained the required distance from the surface of the water it is checked by a kind of grip. The more the mine tugs to rise higher the more firmly it is held. But this is not all. Its struggle puts pressure on the hawser where it is fixed to the sinker, and the fingers are made to claw—"to dig into the bottom of the channel—like some miner searching for gold in a bed of mud." By these highly ingenious means mines are transferred from the submarine, and then firmly anchored in the very highway of shipping.—*Naval and Military Record*, 20/10.

CHANGES AT THE MARINEAMT.—The coming months may bring dramatic developments in the North Sea and the Baltic. Admiral Bachmann has been replaced, as head of the Naval General Staff, by Admiral von Holtzendorff, and it is rumored that the place of Rear Admiral Behncke as vice chief has been taken by Admiral von Koch. Whether this latter appointment has or has not been made will soon become apparent when any naval incident occurs, for it is the vice chief who signs the official announcements issued for the information of the German public. The possibility of an alteration in German naval policy is increased by the fact that Grand Admiral von Tirpitz, the Naval Secretary, has, at least for the time, relinquished his duties. So long as this officer, who may be regarded as the father of the modern German fleet, was in office he exercised no little influence on the Naval Staff. In his absence the new chief takes up his work under conditions favorable to a bold initiative. Admiral von Holtzendorff is much more of a seaman than either the Naval Secretary or the officer he replaces as Chief of the General Naval Staff. For several years he was in command of the High Sea fleet, having succeeded Grand Admiral von Köster in that appointment. He is nothing of a politician, and in that respect he contrasts with Grand Admiral von Tirpitz. But it is reported that he enjoys the confidence of the seagoing fleet, which for some months past has been under a new commander-in-chief.—*Naval and Military Record*, 6/10.

GREAT BRITAIN

VESSELS BUILDING

Name	Displacement	Speed	Armament	Builders	Remarks
Battleships					
Benbow	25,000	22	10 13.5-in., 16 6-in.	Beardmore	Commissioned
Emperor of India	25,000	22	same	Vickers	"
Iron Duke	28,000	22	same	Portsmouth	Commissioned Mar., 1914
Marlborough	25,000	22	same	Devonport	Trials Mar., 1914
Qu'n Eliz'b'h	27,500	25	8 15-in., 16 6-in.	Portsmouth	Launched Oct. 16, 1913
Warspite	27,500	25	same	Devonport	" Nov. 26, 1913
Valiant	27,500	25	same	Fairfield	" Dec., 1913
Malaya	27,500	25	same	Walker	Laid down Oct. 20, 1913
Barham	27,500	25	same	Brown & Co.	Launched Feb., 1914
Roy'l Sover'gn	25,500	21	same	Portsmouth	Laid down, Jan. 15, 1914
Royal Oak	25,500	21	same	Devonport	" Jan. 15, 1914
Resolution	25,500	21	same	Palmer	" Nov. 28, 1913
Ramillies	25,500	21	same	Beardmore	" Nov. 12, 1913
Revenge	25,500	21	same	Vickers	" Jan., 1914
Battle Cruisers					
Tiger	30,000	30	8 13.5-in., 12 6-in.	Brown & Co.	Launched Dec. 15, 1913
Light Cruisers					
Brisbane	5,400	25	9 6-in., 4 3-pdrs.	Sydney	Laid down Jan. 25, 1913
Birmingham	5,440	25.5	same	Elswick	Commissioned, Feb. 3, 1914
Lowestoft	5,440	25.5	same	Chatham	" Apr. 21, 1914
Nottingham	5,440	25.5	same	Pembroke	" Apr. 3, 1914
Aurora	3,600	30	2 6-in., 8 4-in.	Devonport	Commissioned
Arethusa	3,600	30	same	Chatham	"
Penelope	3,600	30	same	Barrow	Laid down Feb. 1, 1913
Phaeton	3,600	30	same	"	" March 12, 1913
Royalist	3,600	30	same	Dalmuir	" June 3, 1913
Galatea	3,600	30	same	"	Commissioned
Inconstant	3,600	30	same	"	Laid down April 3, 1913
Undaunted	3,600	30	same	Govan	Commissioned
Cleopatra	4,400	30	.....	Devonport	Laid down Feb. 26, 1914
Calliope	4,400	30	.....	Chatham	" Jan. 1, 1914
Conquest	4,400	30	.....	"	" Feb. 28, 1914
Cordelia	4,400	30	.....	Pembroke	Launched Feb. 23, 1914
Carystort	4,400	30	.....	"	Laid down Feb. 25, 1914
Comus	4,400	30	.....	Wallsend	" Nov. 3, 1913
Caroline	4,400	30	.....	Birkenhead	" Jan. 28, 1914
Champion	4,400	30	.....	Hebburn	" Feb. 28, 1914

NOTE.—England has approximately 31 destroyers and 24 submarines under construction. (Changes in construction program since war are unknown.)

CANADIAN SUBMARINES THAT CROSSED THE OCEAN.—The American public was recently interested in reports that five submarines, built in Canada for the British Government, had successfully made the passage of the Atlantic, having taken their departure from Halifax, and are now doing good service "somewhere" on the other side.

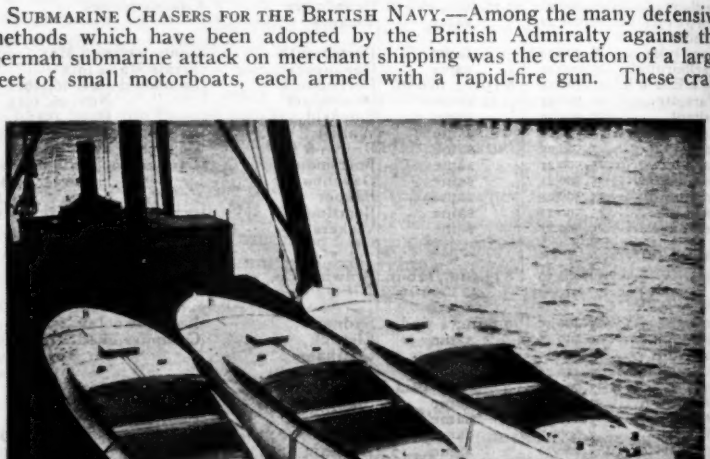
From further information it appears that these vessels are the second instalment of ten boats that were built by the Canadian Vickers plant, near Montreal, from American designs, and are supposed to be the boats that were announced as having been contracted for by an American company, the building of which was prevented by objections from our Department of State.

These boats are each 160 feet long, and were built with the greatest secrecy, and how well the operations were concealed is demonstrated by the fact that practically nothing was published about the departure of the first lot of five, which made a successful passage from Canada to the Dardanelles

early in the season; and it is supposed to be these boats that have done such excellent work both in the Dardanelles and in the Baltic, where an American-built boat is credited with having sunk the German battleship *Moltke*.

While their speed at sea is supposed to have been quite slow, no casualty has been reported in connection with any of these boats, and the long voyage to the Dardanelles, about 7000 miles, is by far the longest ever undertaken by any boats of this class, and far surpasses the performance of the German boats that are supposed to have proceeded from Kiel to the same destination.—*Scientific American, Supplement*, 6/11.

SUBMARINE CHASERS FOR THE BRITISH NAVY.—Among the many defensive methods which have been adopted by the British Admiralty against the German submarine attack on merchant shipping was the creation of a large fleet of small motorboats, each armed with a rapid-fire gun. These craft



THREE OF THE FAST MOTOR BOATS, KNOWN AS "SUBMARINE CHASERS," BUILT FOR RUNNING DOWN SUBMARINES AND SINKING THEM BY GUN-FIRE

were distributed methodically over the areas which were known to be infested with submarines, or along the routes by which they approached and left their hunting grounds, and the moment they sighted a periscope or the hull of the submarine as she approached the surface, they made a swift dash for her and opened fire with the hope of penetrating or breaking off the periscope, or better yet, holing the hull of the vessel itself.

This mosquito fleet was built very rapidly—orders being widely distributed. Our illustrations show three of the "submarine chasers," part of an order of forty, which were built at Lawley's yard, Boston, which have been shipped to England for use in guarding the coasts of Great Britain. There were six in the first shipment. All of these craft are named after various fish of the sea. They are 100 horse-power gasoline launches of uniform design, capable of making 25 knots. The contracts were awarded last spring, and it is stated that they cost $4000 each. They have a strongly built deck forward, for the purpose of mounting a rapid-fire gun, probably of three inches, and below is a commodious trunk cabin containing accommodations for two or three men. They are of the V-bottom type,

and the motors are equipped with a special carbureting device, by means of which either gasoline or a heavy oil may be used.—*Scientific American*, 13/11.

AUSTRALIAN-BUILT CRUISER "BRISBANE" LAUNCHED.—September 30, 1915, will be a date to be remembered in years to come as that upon which the first cruiser built in the Oversea Dominions of the British Empire was put afloat. The event marks another stage in the initial development of the Royal Australian Navy of which the people of the commonwealth have reason to be proud. As most of our readers are aware, the light cruiser *Brisbane*, which was launched at Cockatoo Island, Sydney, on the 30th ult., is a sister-ship of the *Melbourne* and *Sydney*, the trio forming a part of the fleet unit in the construction program of 1909. The *Melbourne* and *Sydney* were built on the Clyde, being laid down in 1911, launched in the following year, and completed in 1913. The Australians, who had assumed control of the naval establishments at Sydney, were anxious to build the third cruiser themselves, and having turned out with success the destroyer *Warrego*, the parts of which were shipped in sections from the Clyde, they embarked in 1913 upon the larger undertaking. They engaged as general manager of their yard Mr. J. J. King-Salter, from the constructional staff at Chatham Dockyard, and the fruits of their efforts under his direction are to be seen in the progress made with the *Brisbane* and also with the second trio of destroyers, the *Swan*, *Derwent*, and *Torrens*, of which the last-named was launched on August 28.—*Army and Navy Gazette*, 10/9.

THE COST OF THE NAVY.—The general public may be forgiven for entertaining mistaken ideas as to the actual cost of the war, for ministers do the fighting services an injustice. For instance, Mr. McKenna, in his budget statement, stated that during the current financial year the national expenditure would amount to £1,590,000,000, and readers of the daily newspapers no doubt assume that that represents the expenditure on the fighting services. He, however, proceeded to give a revised estimate of the cost of the navy and army which threw some light on the matter. When Mr. Lloyd George spoke as Chancellor of the Exchequer last November he estimated that the navy would cost £146,000,000 and the army £600,000,000, representing an aggregate of £746,000,000 during the current financial year. In contrast with these figures, Mr. McKenna stated that under a revised estimate it was calculated that the navy would involve an expenditure of £190,000,000, an increase of £44,000,000, and that the army would require £715,000,000, or £115,000,000 more than was originally anticipated. It is apparent that even under the new conditions which confront the country, the two fighting services represent a charge very much smaller than is generally understood. The aggregate of £905,000,000, which will be spent during the coming financial year on the navy and army, is a very large one, but it is subject to no mean deduction. If there had been no war, the two services would have cost about £80,000,000, so that the net additional sum which is being paid, and represents the real war charge for the twelve months ending March 31 next, is £825,000,000. But this is not all. Owing to the success with which the navy has kept open the maritime communications of the Empire, enabling us to obtain munitions and war materials in vast quantities, the Exchequer under the new scheme of taxation of war profits will in a full effective year obtain an additional sum by taxation, which is estimated at £30,000,000. Consequently, in calculating the cost of the fleet to the country, we must deduct from the total sum of £190,000,000 a matter of £50,000,000, which is the peace expenditure, and £30,000,000, the estimated product of the war profits taxation, with the result that the net cost of the navy is actually only £110,000,000. If this sum be contrasted with the blessings flowing from our sea power, as represented by the comparatively small increase in the cost of food, clothing, etc., it must be apparent that in these days of war the navy is proving an

exceedingly profitable investment, even when allowance be made for the accumulating non-effective vote due to casualities. The white population of the Empire amounts to rather over 60,000,000, and consequently the war charge which the navy represents per capita is less than £2.—*Naval and Military Record*, 29/9.

HOW THE BRITISH FLEET NURSES BRITISH TRADE.—England's imports in October increased $82,000,000, of which the chief increase was food, $15,000,000. However, it happens the official figures show no reflection of our exports of war materials. Perhaps they were concealed under the heading "raw materials," which increased $40,000,000, including cotton, $15,000,000. England's exports also increased by nearly $17,000,000, chiefly in manufactures of textiles and metals. There is nothing surprising about this increase of both exports and imports. It has been the rule of every month regarding imports, but it is only since August that the exports have shown increases over last year. British exports used to range above $200,000,000 monthly. With the declaration of war they fell below $150,000,000 monthly, but now are about as much above that figure.

There is military and financial significance in these figures. They are the best possible answer to the German query and taunt, "Where is the British fleet?" It is doing its duty in policing the seas, and thereby is contributing no small share to the campaign on land. England has a better claim to ask, "Where is the German fleet?" that it allows England to increase its imports of food above a peace level, while bread licenses are issued in Berlin and meat is allowed at all only on certain days. It has been the dream of England's enemies to have peace dictated by bread riots in London. It is the British fleet which makes food plentiful in London.—*N. Y. Times*, 6/11.

HEALTH OF NAVY.—Under peace conditions the navy has always suffered from pneumonia and kindred illnesses, and the liability to such trouble must be greatly increased in time of war, when there is more exposure. The Admiralty, in reviewing the high standard of health maintained during the first year of hostilities, have done well to send to all officers concerned a message of satisfaction for the "very commendable results achieved." The whole British fleet has had to fight climatic conditions more trying and severe in their character than any navy has experienced in the past. The success already achieved in triumphing over these conditions is the best possible augury for the coming winter.—*Naval and Military Record*, 6/10.

DISPOSAL OF PRIZE MONEY.—Signs are not wanting to show that there is to be an attempt to deprive the officers and men of the navy of the prize money for war captures of shipping, which has been awarded by the prize court judges. It is not long since Parliament abolished prize money, chiefly because of its unequal and unfair method of allotment, but when this was under discussion in the House of Commons there were most distinct and definite pledges given that our sailors should be amply rewarded for the taking away of this birthright, by means of a bounty or some other compensation in lieu. But questions are now being asked as to the disposal of the money already awarded during this war, which seem to hint that there are those who do not expect to see the whole sum divided between the fleetmen and their officers. The Prime Minister informed the House that on September 23 the money in the hands of the paymaster general amounted to the somewhat handsome total of £3,754,600, which included "all cases falling within the jurisdiction of the prize courts in this country, whether captures by H. M. ships or seizures by customs officers." Mr. Asquith also stated that "the ultimate destination of prize money was under consideration, and in the meantime it would be irregular to pay it into the Exchequer." It certainly would, as the navy would have a poor chance of getting its proper share of the money if once the Exchequer laid hands on it, for it is to the navy that these funds principally belong.—*United Service Gazette*, 14/10.

GREECE

VESSELS BUILDING

Name	Displacement	Speed	Armament	Builders	Remarks
Battle Cruisers					
Salamis	19,500	23	8 14-in., 12 6-in., 12 3-in.	Vulkan Works, Stettin	Laid down July, 1912
.....	24,000	21.5	10 14-in.	Saint Nazaire	Reported that negotiations have been completed for this ship

THE GREEK NAVY.—The Greek Navy is one of the very few which before the present struggle had had experience of a modern war. In the conflict with Turkey in 1912-13, it showed its efficiency by the alacrity with which it seized the initiative when it was necessary to prevent the enemy from bringing reinforcements into Macedonia from Asia Minor across the Ægean. The conditions gave no opportunity for brilliant victories, but the fleet played its part effectively and well.

During the past 4½ years, the Greek Navy has had the advantage of British training and instruction by staffs of officers under Rear Admirals L. G. Tufnell and Mark Kerr. The former served at Athens from May, 1911, to May, 1913, and the appreciation felt for the work accomplished under his direction was indicated by the decoration conferred upon him by the King of the Hellenes and by the fact that the contract with the British Government was renewed on better terms. Since the conclusion of the war with Turkey, the fleet has been improved by the purchase in July, 1914, of two fairly good ironclads from the United States Navy, the *Mississippi* and *Idaho*, which were renamed *Kilkis* and *Lemnos* respectively, and by the addition of new torpedo craft. The light cruiser *Helli*, formerly the Chinese *Fei-Hung*, was also purchased from the New York Shipbuilding Company on completion in the summer of 1914, and is now serving with the sea-going fleet. At the outbreak of the European War Greece had several ships and vessels under construction in British, German, French, and other yards, but how many of them have been taken over by the respective governments is uncertain. At least the battle cruiser *Salamis*, building at the Vulcan yard, Stettin, has been seized by the Germans. An Athens telegram published in *The Times* on March 31 last stated that of the ships building in England the new light cruiser *Paul Coundouriotis* would be ready in June; that the destroyer *Lesbos* was launched on March 27; and that the destroyers *Crete* and *Chio* would be delivered on May 26. Nothing further has been revealed in this respect. The nominal list of the Greek fleet is as follows:

Name	Class	Displacement	Date of launch	Armament
Kilkis	battleship	13,000	1905	Four 12-in., eight 8-in., eight 7-in.
Lemnos	"	13,000	1905	
Hydra	"	4,808	1889	Three 10.6-in., five 5.9-in.
Psara	"	4,808	1890	
Spestal	"	4,808	1889	Four 9.2-in., eight 7.5-in.
Averoff	Armd. cruiser	9,956	1910	
Helli	Light cruiser	2,600	1912	Two 6-in., four 4-in.
14 vessels	T. B. D.	350-980	1906-12	Various.
5 vessels	T. B.	85	1885	Two 14-in. tor. tubes
2 vessels	Submarine	300-460	1911-12	Five 18-in. tor. tubes.

—*London Times*, 5/10.

HOLLAND

NEW CONSTRUCTION PROGRAM

According to a dispatch from Copenhagen, the Dutch Government has placed with the Krupps an order for two cruisers destined for the defence of the Dutch Indies. The vessels will be built at Amsterdam and Rotterdam from German designs under the direction of German engineers. "The government's decision is much commented upon. The Krupp agents have been busy for the last two months with the Dutch naval authorities at The Hague."—*Shipping Illustrated*, 6/11.

ITALY

VESSELS BUILDING

Name	Displacement	Speed	Armament	Builders	Remarks
Battleships					
Giulio Cesare ...	22,022	22	13 12-in., 18 4.7-in.	Genoa	Completed
Conte-di-Cavour	22,022	22	13 12-in., 18 4.7-in. 14 14-pdrs.	Spezia	"
Leonardo da Vinci	22,022	22	same	Genoa (Odero)	"
Andrea Doria...	22,564	23	13 12-in., 16 6-in.	Spezia	Launched March 30, 1913
Duilio.....	22,564	23	same	Castellamare	" April 24, 1913
4 ships	28,000	24	8 15-in., 16 6-in.	....	Probably laid down during spring and summer, 1915
Small Cruisers					
Basilicata	2,500	16.5	6 6-in.	Castellamare	Laid down Aug. 9, 1913
Campania	2,500	16.5	6 6-in.	"	" Aug. 9, 1913

NOTE.—Italy has about 15 destroyers and two submarines under construction. (Since the war changes in and progress of construction are problematical.)

Interest attaches to the decision of our ally Italy to proceed, despite the war, with the construction of her new super-dreadnoughts, one of which—the *Morosini*—was laid down at Leghorn on June 27. She is thus completing the work of her fleet, and ensuring her future at a moment when Austrian dockyards are either captured, like Monfalcone; or under the daily threat of hostile aerial attacks, like Trieste and Pola. The preference of the watchful and well-informed constructors of the peninsula for the *Queen Elizabeth* type deserves all the more attention, as up to the present Italian experts had—with their *Covours* and *Dorias*—adhered to the principle of superior volume of fire. They now believe in the light of recent submarine developments, that actions will be fought at extreme range and be short and decisive, that there will be no time for prolonged battering and that the advantage will go to the side in a position to deal the heavier blows in the quicker time, which is a question of speed and caliber.—*Naval and Military Record*, 12/9.

EXECUTIVE OFFICERS IN ITALIAN NAVY.—The following appeared in the *Moniteur de la Flotte* for the 4th of September, relating to the Italian Navy: The establishment of executive officers is fixed as follows: admiral, 1; vice admirals, 8; rear admirals, 19; captains (captaines de vaisseau), 61; commanders (captaines de fregate), 90; lieutenant commanders (captaines de corvette), 110; lieutenants (lieutenants de vaisseau), 490; subordinate officers, 340. It was also stated that a naval section of the general staff had been established, to be presided over by a rear admiral or captain.

ITALY'S NAVAL MINISTER.—General regret, in which British naval officers will join sincerely, is felt at the circumstances in which Admiral Leone Viale, the Italian Minister of Marine, has been obliged to resign his important office. He has been suffering for some weeks from an indisposition which has necessitated a slight surgical operation at Genoa, and although not serious the illness means a prolonged absence from duty. Therefore the admiral, inspired by a high sense of the heavy responsibility attaching to his post, tendered his resignation, which the King of Italy accepted on the 25th ult. We trust the late minister will make an early and complete recovery. He will be remembered as the commander-in-chief of the Italian fleet during the latter stages of the Tripolitaine War, having succeeded Vice Admiral Faravelli on April 7, 1912, and he flew his flag in command of the fleet when it was reviewed on the conclusion of the war by King Victor Emanuel in Naples Bay on November 11, 1912. Our Allies are to be congratulated on their choice of a successor to Admiral Viale. The latter's old Chief of the Staff, Vice Admiral Camillo Corsi, has been appointed, and took the oath to the King at the Headquarters of the Supreme Command on the 30th ult. Vice Admiral Corsi is a Roman, and 55 years of age. He saw service in the Abyssinian and Tripolitaine wars, and it was in the latter that he had the valuable experience of serving as Chief of Staff to Admiral Viale. He was also landed to occupy Rhodes and six other islands in the Ægean. It is therefore most fitting that he should assume control of the Italian Admiralty, in which he has the good wishes of the seamen of the Allies.—*Army and Navy Gazette*, 9/10.

JAPAN

VESSELS BUILDING

Name	Displacement	Speed	Armament	Builders	Remarks
Battleships					
Fuso	31,300	22.5	12 14-in., 16 6-in.	Kure	Launched Mar. 28, 1914
Ise	31,300	22.5	....	Kawasaki	Laid down May 5, 1915
Hyuga	31,300	22.5	....	Mitsubishi	Laid down May 11, 1915
Yamashiro	31,300	22.5	....	Yokosuka	Launched Nov. 3, 1915
Battle Cruisers					
Hiyei	27,500	27	8 14-in., 16 6-in., 8 t. t.	Yokosuka	Commiss'd Mar. 31, 1914
Haruna	27,500	27	same	Nagasaki	Launched Dec. 14, 1913
Kirishima	27,500	27	same	Kobe	" Nov. 30, 1913

NOTE.—Japan has two destroyers and two submarines under construction in England and France respectively.

SUBMARINE BUILDING IN JAPAN.—A contract to build a submarine for Italy was signed recently by the Kawasaki Dockyards Co., of Kobe, Japan. The boat will be of the *Laurente* type, and will displace 700 tons when on the surface and 1070 tons when submerged. The length is 250 feet. The boat carries five torpedo tubes, three in the bow and two in the stern, besides anti-aircraft submersible guns and other up-to-date appliances. Her steaming radius is 6000 miles. The hull will be built at the Kawasaki dockyards. The machinery and engines are to be built and sent from Italy. The Kawasaki dockyards have obtained the right to build all future engines and machinery if they so desire in Japan. All the plans and details with the rights are to be furnished them.—*Nautical Gazette*, 28/10.

IMPORTANCE OF SUPER-DREADNOUGHTS

TOKIO, July 2.

The *Jiji* says that after the lessons taught by the Russo-Japanese War no naval power is worth the name without a main fleet of super-dreadnoughts to stand in the first line of battle. It points out that both the Saionji and Yamamoto cabinets prepared a program based on the principle of eight ships of the super-dreadnought type to constitute the main strength, but that owing to financial considerations the former cabinet had to be satisfied with building three ships of that type. The new program to be presented by the navy is believed to consist of four battleships, besides some light cruisers, the work being spread over a period of five or six years.

The naval authorities are apparently satisfied without carrying out the eight-ship standard at once. This program, when completed, will mean eight super-dreadnoughts (the *Kawachi* excepted) and four battle cruisers of the *Kongo* class. They are to constitute the main strength of the Imperial Navy. This standard the paper points out to be the minimum of the naval demand, and when it is taken into consideration that the United States by 1919 will have 24 super-dreadnoughts, and Germany 25 ships of the same class, the paper believes that the new demand of the navy must be the minimum, against which no reasonable opposition could be made. The paper also states that it would be impossible for Japan to compete with either Germany or America in the extent of naval construction. For a nation, however, claiming to have a navy up to date, the paper cannot approve any standard lower than that which the authorities are believed to be planning.—*Reuter, Naval and Military Record,* 15/9.

YAMASHIRO LAUNCHED.—The Japanese battleship *Yamashiro,* a sister ship of the *Fuso,* was launched at Yokosuka November 3. She is the second of four ships of the *Fuso* class to be launched. Construction was begun November 20, 1913, and it is expected she will be completed next year. She will have a displacement of 30,600 tons, a length of 673 feet, and will mount twelve 14-inch guns and sixteen 6-inch guns.—*Shipping Illustrated,* 6/11.

NEW SHIPS LAID DOWN.—The Japanese battleship *Ise* was laid down at the Kawasaki yard on the 5th of May, and the *Hyuga* at the Mitsu Bishi yard on the 11th, while a third, the *Yamashiro,* is to be built at Yokohama. Nothing has been published concerning these ships beyond their displacement (30,000 tons). Four destroyers of about 1000 tons are to be built (including the *Urakaze* and *Kawakazi,* building in England), four smaller destroyers, and two submarines of 700 tons. The new construction now in hand and provided for is estimated to cost £2,333,332 in 1915-16, £3,604,849 in 1916-17, £2,681,864 in 1917-18, and £636,047 in 1918-19.—*United Service Magazine.*

NORWAY

VESSELS BUILDING

Name	Displacement	Speed	Armament	Builders	Remarks
Small Cruisers					
Bjorgvin	5000	16.5	2 9.4 in., 4 6-in., 6 4-in.	Messrs. Armstrong	Laid down Jan. 8, 1913
Nidaros	5000	16.5	same	same	Launched June 9, 1914

NOTE.—Norway has four submarines under construction. (Vessels building in England have been taken over as a war measure.)

RUSSIA

VESSELS BUILDING

Name	Displacement	Speed	Armament	Builders	Remarks
Battleships					
Sevastopol	23,026	23	12 12-in., 16 4.7-in.	Baltic Works	Launched June 29, 1911
Petropavlovsk.	23,026	23	same	" "	" Sept. 9, 1911
Poltava.....	23,026	23	same	New Admiralty	" July 10, 1911
Gangut	23,026	23	same	" "	" Oct. 7, 1911
Emperor Alexander III	22,435	21	12 12-in., 20 4.7-in.	Nikolaieff	" Apr., 1914
Empress Marie	22,435	21	same	Ivan Bunge Co.	" Nov. 3, 1913
Catherine II...	22,435	21	same	" " "	Laid down Sept. 1, 1912
Battle Cruisers					
Ismailia.....	32,200	28	12 14-in., 21 5.1-in.	Galerni	" Dec. 19, 1912
Kinburn.....	32,200	28	same	Baltic Works	same
Borodino.....	32,200	28	same	Galerni	same
Navarino.....	32,200	28	same	Baltic Works	same
Small Cruisers					
Adm. Butakow	7,500	32	15 5.1-in.	Putilow, St. Petersb.	Laid down Nov. 29, 1913
Adm. Spiridov.	7,500	32	same	" "	" Nov. 29, 1913
Svietlana.....	7,500	32	same	Neva!	" Dec. 7, 1913
Adm. Grieg....	7,500	32	same	"	" Dec. 7, 1913
Muravjev Amurski	4,500	..	8 5.1-in.	Elbing	Launched Apr. 11, 1914
Adm. Nevelskoj	4,500	..	same	"	Laid down Feb. 13, 1913
" Lazarev...	7,500	32	15 5.1-in.	N. F. & W. Nikolaieff	" Oct. 19, 1913
" Nachimow	7,500	32	.....	R. S. Co. "	same

NOTE.—Russia has about 45 destroyers and 19 submarines under construction or contract.

THE SEA ROUTE TO SIBERIA.—In another direction an attempt is being made with commendable persistence to shorten an important sea route. Mr. Jonas Lied, who has such faith in the development of the Kara Sea route to Siberia, has just returned from a most successful expedition. It will be remembered that in 1913 he sent the steamship *Correct*—in which expedition the famous Dr. Nansen took a part—to the mouth of the Yenesei River, making the voyage thither from Tromsoe in Norway in some 23 days. A similar enterprise was again successfully undertaken in 1914. This year it went out in more ambitious form, the Siberian Steamship Manufacturing and Trading Company, Limited, despatching two Norwegian vessels, which they had chartered for the purpose of the voyage. These were the *Haugastoel* and the *Eden*, one of 3100 and the other of 2000 tons. The cargo of produce from Central Siberia which they have brought back to Grimsby is said to be of the value of £350,000. At this juncture, when the Siberian railway is entirely monopolized by the Russian Government for the purposes of military transport, there is practically no way of exporting the wheat, hemp, flax and other produce which Siberia, belying its unearned reputation as a snowy desert, affords in such large quantities. Vast quantities of produce have in consequence of the prevailing conditions, to be stored, awaiting some future opportunity of transit. But Mr. Lied was able to bring away a considerable consignment. Next year he hopes to make a much more ambitious adventure and speaks of his intention to set out with a merchant fleet of some twenty sail. The Russian Government has been remarkably energetic and enterprising in the means it has taken to facilitate Mr. Lied's ventures. The difficulty in the undertaking has always been the prevalence of ice in the Kara Sea, and the ignorance of the mariner who approaches it of the conditions which may be prevalent at the moment of

his advent. To meet the situation the Russian Government has established some three wireless stations which can communicate the exact state of the ice and indicate the best course to follow to avoid delay and possible failure to reach the port. It is said that next year a new facility may be added in the provision of aeroplanes, which will examine the ice and report to the wireless stations, so that full information can be afforded to the seamen. Mr. Lied claims that he has now proved that, contrary to all expectation, the Yenesei River can be reached every season by the route he has chosen, and that thus he has opened up a permanent way to the heart of the country.—*The Marine Engineer and Naval Architect*, November.

SPAIN

VESSELS BUILDING

Name	Displacement	Speed	Armament	Builders	Remarks
Battleships					
Espana.....	15,450	19.5	8 12-in., 20 4-in.	Ferrol	Commiss'd Oct. 23, 1913
Alfonso XIII..	15,450	19.5	same	"	Launched May 7, 1913
Jaime I.....	15,450	19.5	same	"	Laid down Feb. 5, 1912

UNITED STATES

THE UNITED STATES DREADNOUGHT "NEVADA."—The latest dreadnought of the United States Navy to be completed and go through her trials is the *Nevada*, which is shown (see frontispiece) steaming down the East River, New York, on her way to have her acceptance trials over the government measured mile course, in which she steamed at over 21 knots.

The *Nevada* possesses several distinctive features which, taken together, are sufficient to render her a type ship, marking a new era in our battleship construction. In the first place she mounts the 3-gun turret—a new type in our navy, which has also been installed on several of the latest ships of foreign navies. The second innovation is the unusual thickness and wide distribution of the heavy armor on this ship; nothing approaching it can be found on any other dreadnought of contemporary design and construction. The third notable feature is that the ship uses oil fuel, all the boilers being oil-fired and no coal whatever being carried for the motive power of the ship.

The main battery of the *Nevada* consists of ten 14-inch guns, six of which are mounted in two 3-gun turrets, one forward and one aft; the other four being carried in two 2-gun turrets, the latter mounted of such a height that their guns can fire across the roofs of the adjoining 3-gun turrets. The torpedo-defence battery consists of twenty-one 5-inch guns mounted on the main and berth decks. This ship also carries four submerged 21-inch torpedo-tubes.

The guns of the 3-gun turrets are mounted in a common sleeve, and, consequently, they are rotated in the horizontal plane and elevated as one gun. To prevent the blast at the muzzles of the guns interfering with the true flight of the projectiles, matters are so arranged that the center gun of the three is fired a small fraction of a second after the outer two. In addition to the saving of weight in the 3-gun turret, there is the advantage that spotting the fall of the shot is simplified, the observation for one shot being good for all three.

The *Nevada* and her sister, the *Oklahoma*, are the most heavily armored ships afloat to-day. They carry a belt which is 13½ inches thick amidships

NAVY DEPARTMENT
BUREAU OF CONSTRUCTION AND REPAIR
VESSELS UNDER CONSTRUCTION, UNITED STATES NAVY, NOV. 10, 1915

Name, type and no. of vessel	Contractor	Per cent of completion			
		Nov. 1, 1915		Oct. 1, 1915	
		Total	% on ship	Total	% on ship
Battleships					
36 Nevada	Fore River S. B. Co.	97.4	97.3	96.4	96.2
37 Oklahoma	New York S. B. Co.	98.2	98.2	98.1	98.1
38 Pennsylvania	Newport News S. B. Co.	90.4	88.1	88.2	86.0
39 Arizona	New York Navy Yard	74.6	72.5	71.7	69.4
40 California	New York Navy Yard	.....	.....	.....	.....
41 Mississippi	Newport News S. B. Co.	33.1	17.4	30.4	15.0
42 Idaho	New York S. B. Co.	45.1	35.3	41.6	30.4
Destroyers					
57 Tucker	Fore River S. B. Corporation	85.7	84.7	84.5	83.0
58 Conyngham	Wm. Cramp & Sons.	88.4	87.6	85.8	84.8
59 Porter	Wm. Cramp & Sons.	85.3	84.5	84.7	83.6
61 Jacob Jones	New York S. B. Co.	92.2	92.2	90.4	90.4
62 Wainwright	New York S. B. Co.	91.5	91.5	89.8	89.8
63 Sampson	Fore River S. B. Corporation	65.1	60.5	56.8	50.9
64 Rowan	Fore River S. B. Corporation	57.5	51.5	52.0	45.3
65 Davis	Bath Iron Works	57.3	54.0	52.1	48.9
66 Allen	Bath Iron Works	53.8	50.0	46.0	42.1
67 Wilkes	Wm. Cramp & Sons.	34.1	28.6	29.9	23.7
68 Shaw	Mare Island Navy Yard	12.5	7.8	8.5	6.2
69	Mare Island Navy Yard	0.0	.....	.....	.....
70	Norfolk Navy Yard	0.0	.....	.....	.....
71	Seattle Construction & D. D. Co.	0.0	.....	.....	.....
72	Wm. Cramp & Sons.	0.0	.....	.....	.....
73	Wm. Cramp & Sons.	0.0	.....	.....	.....
74	Bath Iron Works	0.0	.....	.....	.....
Destroyer Tenders					
2 Melville	New York S. B. Co.	99.8	99.8	99.8	99.8
Submarines					
27 G-2[1]	Lake T. B. Co. (Bridgeport)	89.7	89.7	89.7	89.7
31 G-3[1]	Lake T. B. Co. (Bridgeport)	88.6	88.4	88.6	88.4
40 L-1	Electric Boat Co. (Quincy)	98.9	98.9	98.9	98.9
41 L-2	Electric Boat Co. (Quincy)	98.5	98.5	98.4	98.4
42 L-3	Electric Boat Co. (Quincy)	98.1	98.1	98.1	98.1
43 L-4	Electric Boat Co. (Quincy)	98.1	98.1	98.1	98.1
44 L-5	Lake T. B. Co. (Bridgeport)	81.0	74.5	79.6	73.8
45 L-6	Lake T. B. Co. (Long Beach, Cal.)	70.1	67.1	68.5	65.4
46 L-7	Lake T. B. Co. (Long Beach, Cal.)	67.4	63.7	66.0	62.2
47 M-1	Electric Boat Co. (Quincy)	88.7	88.4	87.4	87.1
48 L-8	Portsmouth, N. H., Navy Yard	56.2	53.7	51.2	50.7
49 L-9	Electric Boat Co. (Quincy)	86.4	84.7	80.0	75.9
50 L-10	Electric Boat Co. (Quincy)	83.9	80.4	79.5	74.2
51 L-11	Electric Boat Co. (Quincy)	80.3	75.1	74.8	68.3
52 Schley	Electric Boat Co. (Quincy)	0.0	0.0	0.0	0.0
53 N-1	Electric Boat Co. (Seattle)	34.3	28.8	23.8	18.9
54 N-2	Electric Boat Co. (Seattle)	34.3	28.8	23.8	18.9
55 N-3	Electric Boat Co. (Seattle)	34.3	28.8	23.8	18.9
56 N-4	Lake T. B. Co. (Bridgeport)	44.0	36.2	38.3	33.6
57 N-5	Lake T. B. Co. (Bridgeport)	41.9	35.3	37.2	32.8
58 N-6	Lake T. B. Co. (Bridgeport)	40.0	33.4	35.4	31.0
59 N-7	Lake T. B. Co. (Bridgeport)	40.4	33.7	35.4	30.9
62	Portsmouth N. H. Navy Yard	0.0	.....	.....	.....
63	Puget Sound Navy Yard	0.0	.....	.....	.....
64	Electric Boat Co. (Quincy)	0.0	.....	.....	.....
65	Electric Boat Co. (Quincy)	0.0	.....	.....	.....
66	Electric Boat Co. (Quincy)	0.0	.....	.....	.....
67	Electric Boat Co. (Quincy)	0.0	.....	.....	.....
68	Electric Boat Co. (Quincy)	0.0	.....	.....	.....
69	Electric Boat Co. (Quincy)	0.0	.....	.....	.....
70	Electric Boat Co. (Quincy)	0.0	.....	.....	.....
71	Electric Boat Co. (Quincy)	0.0	.....	.....	.....
72	Lake Tor. Boat Co. (Bridgeport)	0.0	.....	.....	.....
73	Lake Tor. Boat Co. (Bridgeport)	0.0	.....	.....	.....
74	Lake Tor. Boat Co. (Bridgeport)	0.0	.....	.....	.....
75	Cal. S. B. Co. (Long Beach, Cal.)	0.0	.....	.....	.....
76	Cal. S. B. Co. (Long Beach, Cal.)	0.0	.....	.....	.....
77	Cal. S. B. Co. (Long Beach, Cal.)	0.0	.....	.....	.....
Submarine Tenders					
2 Bushnell	Seattle Construction & D. D. Co.	98.7	98.5	97.9	97.6
Fuel Ships					
14 Maumee	Mare Island Navy Yard	96.8	96.5	96.2	95.8
15 Cuyama	Mare Island Navy Yard	8.1	0.0	0.0	0.0
Miscellaneous					
Supply Ship No. 1	Boston Navy Yard	31.1	28.5	26.3	23.9
Transport No. 1	Phila. Navy Yard	36.1	33.0	33.9	30.4

[1] Contracts forfeited, vessels being completed New York Yard.

and is 17½ feet wide, 8½ feet of the belt being below the load water-line. The barbettes are protected by 13 inches of armor and the turret armor is from 9 to 18 inches thick on the triple turret and 9 to 16 inches thick on the double turret. A valuable feature is the protection of the base of the single smokestack by inclined armor which extends from the gun deck to the forecastle deck. The conning tower is also protected by 16 inches of armor.

The great beam of the ship and the fact that no space is taken up in the wings by coal bunkers, make it possible to group the whole of the boiler equipment amidships and lead all the uptakes to one large smokestack. The batteries of boilers, as so assembled, are grouped in several separate apartments formed by running transverse and longitudinal bulkheads throughout the boiler spans.

The *Nevada* is driven by Curtis turbines, the sister ship *Oklahoma* being furnished with triple-expansion, reciprocating engines. The fuel tanks are capable of carrying 2000 tons of oil. The normal displacement of the *Nevada* is 27,500 tons and the full load displacement 28,400; the complement of officers and men is 863.—*Scientific American,* 13/11.

During her endurance trials in Massachusetts Bay November 5, the new U. S. battleship *Nevada* made an average speed of 20.54 knots for 12 hours. The contract called for 20.5 knots, so that the ship was apparently just able to squeeze through. The trials were interrupted November 6 for the purpose of overhauling the Curtis turbines which have given no little trouble since the ship came out. It is reported that during her fuel consumption trials run November 9, the *Nevada* showed an economy of 10 per cent over the quantity stipulated in the contract for a 12-hour run at 15 knots.—*Shipping Illustrated,* 13/11.

SUPER-SCOUT CRUISERS.—While the General Board has approved plans for six eight gun, 35-knot super-battle cruisers to be built within the next five years, navy officers and officials, it was learned to-day, are not unanimous in favoring this type of ship. Before Secretary Daniels decided to recommend the big ships, an alternative plan for another type of vessel to cost about a third as much had many adherents. The chief reason for favoring the smaller and less expensive ships, it is said, was that for the amount to be expended on the battle cruisers, 18 of the other type could have been built and equipped, probably in considerably less time.

For a Super-Scout Cruiser.—The alternative type is a super-scout cruiser ranging from 7500 to 10,000 tons displacement with very light armor and equipped with only two 14-inch guns, one mounted forward and one aft on the decks without turret protection. By this great saving in weight vessels of high speed, great endurance and wide cruising radius could have been obtained to reinforce the slower and smaller scout cruisers and destroyers in their mission of breaking an enemy's communication lines, destroying his commerce at sea and overwhelming convoys composed of light cruisers or destroyers. It is said that a speed of 40 knots for these ships was suggested to enable them to flee from an enemy of greater gun power but slower speed, such as a battle cruiser.

The General Board, it is said, favored construction of the bigger ships on the theory that since European navies were equipped with battle cruisers it was necessary for a well-balanced navy that the United States should have equal or superior craft in gun powder and speed. It was argued that battle criusers of the type recommended would not be compelled to seek safety from anything but a heavily armored and armed battleship.—*N. Y. Sun,* 22/10.

THE "MACHIAS" TO BE OVERHAULED.—The United States gunboat *Machias,* which has been here since October 25, steamed Wednesday for New Orleans. At the New Orleans Navy Yard the *Machias* will be dry-

docked, thoroughly overhauled, furnished with new flooring and have her boilers retubed. The work of rehabilitation will require nine weeks.—*N. Y. Herald*, 4/11.

THE NEW DESTROYERS.—The Navy Department has awarded the contracts for construction of six torpedo-boat destroyers and 16 coast defence submarines. These contracts total more than $13,000,000. Part of the work is to be done by the government itself. Following are the submarine awards:

Eight to the Electric Boat Co.; at $545,000 each.
Three to the Lake Torpedo Boat Co., at $545,000 each.
Three to the California Shipbuilding Co. (Lake design), at $548,500 each.
One to the navy yard, Portsmouth, N. H.
One to the navy yard, Puget Sound, Washington.

The vessels to be built at the navy yards will be after the designs of the Electric Boat Co.'s patents, for which the government will pay $1000 for each boat. Following are the awards for the construction of destroyers:

Two vessels to the William Cramp & Sons Co., Philadelphia, at $845,000 each.
One to the Seattle Dry Dock and Construction Co., at $885,000.
One to the Bath Iron Works, Bath, Me., at $879,500.
One to the navy yard, Mare Island, Cal., in accordance with its estimate of $762,638.
One to the Norfolk (Va.) Navy Yard, in accordance with its estimate of $706,305.

The principal characteristics of the new destroyers will be: Length over all, 315 feet; beam, 30 feet 7 inches; draft, 8 feet; displacement, 1125 tons. They will mount a number of 4-inch Q. F. guns, two anti-aircraft guns and four triple torpedo tubes. Propulsion will be by oil fuel fired water tube boilers and turbines and they will have a speed of 30 knots. The vessels to be built will be in the main in accordance with the department's designs, as outlined above, except in the case of the one boat to be built by Bath Iron Works, which will be according to the bidder's design of machinery, for which that company guarantees results in speed and cruising radius somewhat in excess of those required by the department. The contract was placed with this company for this special boat in pursuance of the department's policy of encouraging private enterprise which promises progress along scientific engineering lines. The award of contract for one vessel to the Seattle Construction and Dry Dock Co. marks the beginning of the first vessel of this class to be built on the Pacific Coast by a private concern since the completion of the *Paul Jones, Perry* and *Preble* in 1902. It also marks the entry of this company into the field for building this class of vessel.—*Shipping Illustrated*, 23/10.

NAMES FOR NEW DESTROYERS.—Names for six of the new U. S. torpedo-boat destroyers, now under construction, were selected by the Navy Department as follows: *Sampson, Rowan, Davis, Allen, Wilkes* and *Shaw*. The *Sampson* is named for Rear Admiral William T. Sampson, who was in command of the naval forces operating against Spain in the West Indies in 1898. The *Rowan* is named for Vice Admiral Stephen Clegg Rowan, who served in the Mexican and Civil wars. The *Davis* is named for Rear Admiral Charles Henry Davis, who was a member of the board on iron-clad ships which recommended the construction of the *Monitor*, and was a flag officer in 1862. The *Allen* is named for Commander William Henry Allen, who entered the navy in 1800 and died in 1813. He was third lieutenant of the *Chesapeake* in 1807 when she struck her flag to the British ship *Leopard*, and he fired the only gun from the *Chesapeake*. The *Wilkes* is named for Rear Admiral Charles Wilkes, who commanded the expedition of 1838-42, which explored islands of the Pacific. He commanded the *San*

Jacinto in 1861, when she took from the British steamer *Trent* the Confederate Commissioners Mason and Slidell. The *Shaw* is named for Captain John Shaw, another early hero of the navy, who died at Philadelphia in 1823.—*Army and Navy Journal*, 16/10.

SHIPS TO BE RE-ENGINED.—The *North Dakota* (battleship, commissioned November 3, 1910); the *Salem* (scout, commissioned August 1, 1908); the *Henley* (destroyer, commissioned December 6, 1912) and the *Mayrant* (destroyer, commissioned July 12, 1911), have been ordered to be re-engined by the Navy Department and authorization to this effect will be asked of Congress. All these vessels—save the *Mayrant*—were built by the Fore River Shipbuilding Co., Quincy, Mass., and are fitted with Curtis steam turbines. The *Mayrant*, built by Cramp's, Philadelphia, is fitted with Zoelly turbines, which have figured in a suit brought by the Fore River Co. for infringement of the Curtis patents. The suit was decided in favor of the Fore River Co. It would now seem as if the Zoelly turbine had been as unsatisfactory in service as the Curtis type, judging from the above announcement.—*Shipping Illustrated*, 23/10.

FORE RIVER EXTENSION.—The Fore River Shipbuilding Corporation, Quincy, Mass., has ordered extensive additions to its facilities, consisting of new ways of the double type, 138 feet wide and capable of building a battle cruiser 100 feet broad or other large warship, or two ships not over 60 feet beam. The ways will be 800 feet and located under a gantry to carry the traveling cranes. The yard now has nine slips. A ship tool shop to cost $500,000 without equipment is under way. A $600,000 power-house is being arranged for and an oxygen plant to cost $20,000 will soon be built. The company buys from 15,000 to 20,000 feet of oxygen weekly. Plans are under way for extending the yard across Bens Creek to land owned for 20 years but never used. A seawall is to be built and behind it will be solid fill, so that this waterfront may be used for fitting out. Thus, crowding of the present yard will be relieved. It is estimated that the expenditures for buildings and equipment will cost two millions.—*Shipping Illustrated*, 23/10.

BIG DRYDOCK AT HUNTER'S POINT.—Plans for a drydock to be built by the Union Iron Works at Hunter's Point, to be large enough to accommodate the largest battleship built or building, were approved October 15 by the Secretary of the Navy. Representatives of the company announced that construction would begin immediately. The dock will be 1000 feet long, 110 feet wide and will take vessels of 40 feet draft.—*Shipping Illustrated*, 23/10.

LAKE TORPEDO CO. EXTENSIONS.—The Lake Torpedo Co., Bridgeport, Conn., is extending its land holdings to establish a new shipyard for the building of submarines, destroyers and fast cruisers for foreign governments. The company also has let a contract for the erection of a large new machine shop in its No. 1 shipyard. The decision to take foreign contracts is a change in the policy of the company. Since Mr. Bryan laid down the rule that the selling of submarines to belligerents constituted a breach of neutrality the company has refused many orders from the warring powers. Mr. Schwab found a way around the rule by shipping submarine parts to Canada and assembling them there, and the Lake concern purposes to do likewise.—*Shipping Illustrated*, 30/10.

UNION IRON WORKS LOWEST BIDDER FOR SUBMARINES.—The Union Iron Works of San Francisco was found to be the lowest bidder on contracts for the construction of 16 submarines of the coast defence type, bids for which were opened at the Navy Department September 30. This firm is controlled by the Bethlehem Steel Co. Their bid was for five or more submarines at $510,000 each. A striking feature of their offer was a promise of delivery within 12 months from date of contract. Most of the other bidders

wanted from 20 to 25 months for construction. The limit set by Congress on the cost of these submarines was $550,000. Other bids were: Electric Boat Co., eight or more submarines at $532,000; New York Shipbuilding Co., two boats at $550,000; Newport News Shipbuilding & Drydock Co., two boats at $548,000; California Shipbuilding Co., not less than three nor more than five, at $548,000; Lake Torpedo Boat Co., for five or six boats at from $532,000 to $545,000.—*Shipping Illustrated*, 2/10.

RE-CREATION OF GRADE OF COMMODORE.—The re-creation of the grade of commodore in the navy has been suggested in the consideration of personnel legislation at the Navy Department. This rank was abolished at the close of the Spanish-American War. It is insisted that this was done without the approval of the service and that commodore fills a place in the United States Navy that cannot be filled either by the grade of rear admiral or captain. There is at present a shortage in flag officers for the navy, and instead of creating more rear admirals it is insisted that the rank of commodore should be re-established. Commodore corresponds to the grade of brigadier general in the army and is a suitable rank for the commander of a division. There is now need for four flag officers to command four divisions of the Atlantic fleet, and one for commander-in-chief. There should be a flag officer for the cruiser squadron and one for the torpedo and submarine flotilla on the Atlantic. With the increase in the number of destroyers and submarines this flotilla must be divided, which will make a command for another flag officer. On shore there should be flag officers at the Norfolk, New York, Boston and Philadelphia Navy Yards, making a total of 12 flag officers for the Atlantic coast and fleet. This leaves only six rear admirals for duty at the Navy Department, Navy War College, the Pacific fleet and navy yards, the Asiatic fleet and the Philippines. There is need for a flag officer with the Pacific fleet and at the navy yards, the Asiatic fleet and the Philippines. There should be flag officers with the Asiatic fleet and the Pearl Harbor yard and dock. To supply all these commands and at the same time remove the "hump" in the lower grades of the navy it is urged that the grade of commodore should be created, to which the captains should be promoted. The title of commodore is distinctively American, as it exists in no other navy. It is associated with some of the most brilliant officers in the history of the United States Navy and appeals very strongly to the older officers in the service.

Active Reserve Provision in Abeyance.—At a meeting of the Roosevelt Personnel Board October 29 it was decided to defer the operation of the active reserve provision of the Navy Department's Personnel bill for three or four years. A system of promotion by elimination in competitive examination was taken under consideration and will probably be incorporated in the bill. Assistant Secretary of the Navy Roosevelt declared that there will be an increase in the number of officers in the higher grades as well as in the number of midshipmen provided for in the administration's personnel program. He is favorably impressed with the proposition of re-creating the grade of commodore.—*Army and Navy Journal*, 30/10.

NAVY PLANS TRAINING CAMPS.—The Navy Department is considering plans for citizen training camps such as were instituted by the army last summer. It is proposed to establish two camps next summer, one at Chicago and the other on Narragansett Bay . There is some doubt as to whether it is possible to hold the camps on account of legal and other difficulties.

Proposals for incorporating motor-boat owners into an auxiliary naval reserve are also being considered.—*N. Y. Sun*, 9/11.

THE NAVAL ADVISORY BOARD.—The civilian Naval Advisory Board met in special session at India House in New York City on November 4 to select the committees which are to have particular charge of the various technical problems submitted to the board by the Navy Department. Thomas A.

Edison, chairman of the board, is on his way home from the Panama-Pacific Exposition, and in his absence Vice Chairman W. L. Saunders presided. Chairmen of committees were elected as follows:

Chemisty and Physics—W. R. Whitney.
Aeronautics, Including Aero Motors—Henry A. Wise Wood.
Internal Combustion Motors—Andrew L. Riker.
Electricity—Frank J. Sprague.
Mines and Torpedoes—Elmer A. Sperry.
Submarines—William Le Roy Emmet.
Ordnance and Explosives—Hudson Maxim.
Wireless and Communications—P. C. Hewitt.
Transportation—Benjamin B. Thayer.
Production, Organization, Manufacture and Standardization—Howard E. Coffin.
Ship Construction—Frank J. Sprague.
Steam Engineering and Ship Propulsion—Andrew M. Hunt.
Life-saving Appliances—Spencer Miller.
Aids to Navigation—Elmer A. Sperry.
Food and Sanitation—L. H. Baekeland.
Public Works, Yards and Docks—Alfred Craven.—*Army and Navy Journal*, 6/11.

VOLUNTEER NAVAL RESERVE URGED.—The Secretary of the Navy was urged to-day to form an aeronautical reserve for the navy as soon as possible. This request was made by Captain Hugh Willoughby, of the Naval Reserve Committee of the Navy League, the first amateur aeronaut and aviator in the United States. He called on Secretary Daniels and offered his services for the naval reserve.

Captain Willoughby was told that no provision was made for enrolling aviators and aeronauts for the naval reserve unless they were men who formerly had been naval officers or enlisted men in the navy.

Captain Willoughby declared he was much surprised that no provision had been made for enrolling not only men like himself, but also amateur aviators and aeroplane owners who could be of great service in time of war, as well as the sailors of merchant marine, lake shipping and fishing fleets.

Captain Willoughby suggested to Secretary Daniels that a vigorous effort be made to have a law placed upon the statute books providing for a general naval reserve made up of all men so trained as to be serviceable who could be persuaded to enlist for reserve service.—*N. Y. Herald*, 23/10.

PLANS FOR A NAVAL RESERVE.—Plans for the organization of a naval reserve something on the basis of the proposed Continental Army are rapidly being gotten into shape to be submitted to the Navy Department, by Assistant Secretary of the Navy Roosevelt. The reserve is to be used principally at shore stations to relieve the regular personnel of the navy in the event of war. It is to consist principally of specialists or experts, such as radio operators and marine engineers. The Assistant Secretary has plans for the use of about 50,000 men in the naval reserve. The naval reservists are not to be enlisted, but are simply to agree to respond to the call of the country in the event of war. It is planned to conduct schools of instruction for reserves like that of Plattsburg, which can be attended by those who desire to qualify for this service. When they are qualified they will be assigned to stations, and all that will be required of them is to keep the Navy Department advised as to their whereabouts. By keeping their addresses on file the Secretary of the Navy can mobilize the reserves by wire in the event of war.—*Army and Navy Journal*, 6/11.

NAVY TO ORGANIZE MOTOR BOATS FOR INTELLIGENCE WORK.—That the Navy Department is preparing to organize various adjuncts for intelligence purposes in case of war was learned here to-day. This proposed organization work, it was stated by a high official of the department, relates chiefly to motor boats and radio stations.

Each navy yard in the United States will be a center of an organization district, as will also the naval stations at Hawaii, Panama and in the Philippines. It is proposed that a registry be made of all merchant vessels that would be available in the event of war, including small craft. It is proposed that the small radio stations be made into "eavesdropping" institutions in the event of war, and that there be established naval training camps.

Congress may be asked to pass a law requiring motor boats and power boats to carry registry numbers, so that the government will be able to keep track of them. This idea has been brought from Great Britain, where hundreds of small craft, manned by civilian crews trained for the work, have been so successful in destroying German submarines.

Naval officers believe that in the event of war much use would be found for this type of fast mosquito craft. They would be able to aid the slower going coast defence submarines by getting information for them, and would be useful in other ways. The first line of scouts would, of course, be the destroyers and the scout ships, but the smaller boats would make a very effective second line of scouts, especially if their speed enabled them to get away from the enemy in a hurry.

They would be able to keep the submarines in touch with the movements of the enemy and report directly the tactics of the enemy ships.—*N. Y. Herald*, 23/10.

ORGANIZATION OF AN ENGINEERING RESERVE FOR THE NAVY.—When the real test—war—is put to any military organization, efficiency demands that every fighting machine be fully manned by men familiar with their duties. It is hardly ever practical or desirable that all the men necessary to full fighting efficiency be carried in active service. It is necessary, therefore, to have an efficient reserve. It is the purpose of this article to suggest such a reserve for the engineering department of our navy.

The most valuable men in this reserve would be those who had at some time served in the engineering department of naval vessels. Such men should be listed and classified, and should form the backbone of the reserve. Having done this, the different groups should be formed. The man to be in charge of each group should be designated and given a list of ex-navy men in his group. These ex-regulars would form the nucleus of each group, but not necessarily the total number of the group.

In estimating the number necessary for an ample reserve, the following points would have to be kept in mind:

(1) The existing shortages of men; (2) the probable vacancies that would occur during a state of war; (3) the number of vacancies occurring each year due to additional ships, etc.; (4) the number of vacancies occurring from all other causes, such as death, disability, etc. With this information carefully worked out, it would be possible to arrive at the number of men that should be carried in reserve.

The groups should be formed, the headquarters of each group being designated. The one in charge of each group should be furnished with a list of the ex-regulars assigned to his group, and the number necessary to make his complement full. If the number of regulars falls short of his full complement he must at once take steps to fill out his command by enlisting more men.

The enlistment term should be for the same length of time as men in the active service. When once a man has joined the reserve the discipline should be such that the serious purposes of the organization will be fully realized.

The meetings should be regular and all members should be required to be present at each meeting. At these meetings the men should be drilled and instructed in their duties according to their ratings.

The Navy Department should be kept in close touch with each group through those in command. The reserves should be kept informed of the

latest methods and practices, etc., of the active service; and if possible given opportunities to take short cruises on board regular ships of the line.

When the members of the reserve organization are actually doing active duty, either on a practice cruise or in an emergency, they should receive the regular pay and allowances according to rank or rating the same as the men on the active list. Places of meeting throughout the year should be provided without expense to the members of the organization and incidental expenses should be provided by the government. The members should also be provided, without cost, with drill manuals, copies of fleet regulations and all orders, general and special, issued by the Navy Department. In short, everything possible should be done to keep the reservists in as close touch as possible with the regular service.

The advantages of such a reserve worked out in detail along the lines mentioned cannot be overestimated. In the event it should be necessary to call for more men, in time of war, preparatory orders could be issued to those in command of all the reserve groups. There would be no confusion; the men would assemble quietly and hold themselves in readiness. They would know their stations and general duties. In fact, if the organization has been carefully worked out each man's duties would be clearly mapped out.

Compare this method to that of getting the men at the last minute. Picture the confusion resulting from a general rush to places of enlistment! Think of the mass of raw material that would have to be drilled and organized and weeded out! The national crisis could be such that every day lost would be so costly that months of fighting would be necesssary to gain the advantage.

Let us never lose sight of the fact that our navy is a fighting machine, organized for the protection of the nation. The time to work out and perfect the smallest details in the organization of the engineering department of the navy is in time of peace. It behooves every thinking man to think, and think hard, make suggestions, and give his services if required.

St. Louis, Mo. ARTHUR C. MEYERS.

—*International Marine Engineering*, October.

Noting the failure of the law providing a National Naval Reserve, in which it was expected large numbers of former enlisted men of the U. S. Navy would enroll, the magazine *Our Navy*, devoted to the interests of the enlisted man, states that the opinion of the enlisted men as to the proposed measure, the men best qualified to give an opinion, was never sought. "Never," says *Our Navy*, "was the opportunity so golden for the department to call in all kinds and classes of enlisted men and at least to hear what they had to say. Who should be so able to tell what might attract or hold a bluejacket as the bluejacket himself? Pending the time when the enlisted man will be called upon officially to tell what is the matter with the reserve bill, the department might ponder a few of the following suggestions for amendments: (1) Total permanent additions to pay; (2) three-fourths pay after twenty-five years; (3) right to enter reserve in next higher rating after examination; (4) right to treatment in naval hospitals upon payment of ration money; (5) graded pension provisions for men discharged by reason of physical disability. Congress will be more liberal this session with the navy and none of these proposed amendments are expensive or unreasonable, and they would go a long way toward making the Reserve more popular."

BUREAU OF SUPPLIES AND ACCOUNTS.—The annual report of the paymaster general of the navy, Samuel McGowan, is a record of achievement in improving the administration of the Naval Bureau of Supplies and Accounts, which shows that we have in this case accomplished the not always easy task of getting the round peg in the right hole. "The navy," we are told, "being afloat and the shore establishment being of use only in so far as it contributes to fleet efficiency, the ideal way in which to con-

duct the activities of any strictly service bureau would seem to be to follow as closely as possible the administrative methods of the fleet. With this in view there have been inaugurated intrabureau orders corresponding in a general way to fleet regulations, and section orders intended to parallel those of a ship. By such orders it has been practicable to make known and keep a record of policy and procedure, with the result that prompt and concerted action is secured and the same type of question need ordinarily be considered but once."

Other intrabureau orders issued about the same time required that the place be cleaned up and kept clean, that the number of form letters be increased to avoid unnecessary typewriting, that all communications be less stereotyped and more polite, that all guest chairs and other useless furnishings (especialfy rugs and roll-top desks) be removed, that outsiders be excluded from rooms in which the clerks work, that official letters be encouraged and personal interviews discouraged, that desks be cleaned and standardized inside and out, that smoking in the hallways be stopped, that bids be handled with punctilious care between the time of their receipt and the hour for opening and that official information be furnished only by those in authority.

Specific orders were issued showing in detail how to conduct correspondence, how to conduct the business of the purchase section, how to secure the widest competition and at the same time get supplies promptly. The General Board is considering the increase of transportation and storage and handling facilities. "The advisability of consolidating and centralizing stores need scarcely be pointed out." While during the past four years the ship tonnage fit for active service has increased about 30 per cent, the value of stock increased practically not at all. This condition should not be permitted to longer continue; for it is a matter of history that the issue of nearly every great conflict has in the last analysis depended largely upon the question of supply. There should be no real difference between peace times and war times—between peace footing and war footing—with respect to ship supply.—*Army and Navy Journal*, 6/11.

SUBSISTENCE COST OF NAVY MEN LESS.—The cost of subsistence for the enlisted men of the navy has shown a slight decrease in the last fiscal year, according to the annual report of Samuel McGowan, paymaster general of the navy. The paymaster general's report shows that the average daily cost of subsistence per man has declined from $0.36648 in the fiscal year 1914 to $0.36038 in the fiscal year 1915.

Prices of coal and fuel oil also showed a reduction. Cargo coal at Hampton Roads is from 20 to 25 cents less per ton, according to the report, while the price of oil per barrel has fallen from $0.78 to $0.64. The paymaster general states that on account of the scarcity of vessels and the high ocean freight rates it has been found economical to ship coal in naval colliers from the Atlantic coast to points on the Pacific coast and in the Philippines. He estimated that $57,000 was saved by shipping two large cargoes of coal from the Atlantic coast to the Philippines. The need of better storage facilities ashore is emphasized by the report, which states that this subject has been studied by the General Board of the navy.

"Storage ashore in general is at present barely sufficient to meet the normal demands of the fleet," says the report. "The advisability of consolidating and centralizing stores need scarcely be pointed out. For each additional ship there should be a corresponding increase in the storage on shore; and, of course, the same is true of what might be called storage afloat—supply ships and colliers. The whole problem of fleet supply has been carefully studied with a view of formulating comprehensive plans for use in time of stress."

Paymaster General McGowan is making a serious attempt to cut down the mass of correspondence which circulates persistently between the various

officers. At present a slight error in the Navy Department may cause an interchange of correspondence that will last six months and involve every bureau.—*N. Y. Herald*, 1/11.

THE NAVY OUR FIRST LINE OF DEFENCE.—It is reassuring to learn from the President himself that during the coming Congress he will bend his energies to the task of building up our naval and military forces to a standard of strength commensurate with the size and wealth of the country and the importance of its national policies.

As to the size and wealth of the country, it is sufficient to point to the fact that we number some one hundred millions and that our national wealth is over one hundred and fifty billions, fifty billions of which wealth is found on the seaboard and within easy reach of an enemy's fleet and a hostile expeditionary landing force.

As to our avowed national policies, it suffices to name the Monroe Doctrine, the "open door" in China, the neutralization of the Panama Canal, and the exclusion of the Asiatics, particularly as affecting that great and rapidly growing naval and military power, Japan.

We have so recently, in the series of articles, "Our Country, an Undefended Treasure Land," laid down the lines along which, as a minimum, our military forces should be increased, that it is sufficient to refer to our issues in which they appeared.

It is to the United States Navy, as our first line of defence, that we now direct attention. If our navy be restored to the rank of second in relative strength among the navies of the world, which it held in 1905, the United States need stand in little fear of invasion. Great Britain, of course, will ever remain the dominant naval power; but war with her is unthinkable.

The Spanish War opened the eyes of the United States Congress to the controlling influence of sea power, and the country and its Congress, under the dominating influence of a strong and popular President, set about the task of creating a navy commensurate with the needs of the United States, with such zeal that in the brief period of half a dozen years, we had risen to that position of second naval power, which should be ours to-day. In the interval between 1898 and 1904-05 Congress appropriated so liberally for the navy that the average addition to the navy was four armored ships per year.

Since 1905 we have neglected the navy to such an extent that the average number of armored ships added to the navy has fallen from four to one and one-half annually. Hence, to-day, we stand fourth in total tonnage and rank as a third-class power in the strength of our first or dreadnought line.

There is but one first-class navy, the British, with some 40 dreadnoughts; there is but one second-class navy, the German, with 22 dreadnoughts; and there are three third-class navies (reckoned in terms of dreadnoughts) the United States with 10 dreadnoughts, and the French and Japanese, whose dreadnought line is at present smaller in numbers, but is rapidly overtaking our own.

President Wilson has the opportunity—by virtue of the strong confidence of the public and his remarkable control of Congress—to restore our navy to that proud and proper rank to which President Roosevelt had brought it in 1905. If this is to be done it should be done with all possible expedition; and, by utilizing the full shipbuilding resources, both of the navy yards and the yards of the private shipbuilding firms, it would be possible to carry our navy up to the second rank not long after, and possibly by the close of the present European War.

To-day we have 14 dreadnoughts built and building. Congress should authorize the immediate construction of six 33,000-ton, 28-knot battle cruisers, each carrying eight of the new type 16-inch gun. On 33,000 tons it would be possible to give these ships 12 inches of protection on belt and gun positions.

As a fast wing of the fleet and for breaking through the cruiser screen of the enemy they would be unrivaled, and they could "lie in the line" against any ships that are afloat to-day.

Also, the forthcoming Congress should authorize the construction of a dozen 5000-ton, 30-knot scouts, of the British *Arethusa* class, mounting a heavy battery of 50-caliber 5-inch guns.

Our destroyer fleet should be strengthened by the addition of 36 1000-ton destroyers of our latest type; and the submarine fleet should be increased by building a dozen large 20-knot sea-going submarines of the type now under construction, and two dozen coast defence submarines of smaller displacement.

The above, with the necessary increase in the numbers of our officers and men, to make good our present deficiency of 1000 officers and 20,000 men, and provide crews for the new ships as they come into commission, would rapidly bring the United States Navy up to a standard of strength, where it could present an unbreakable line of defence against any possible attack from the navies of the old world.

Our government and private yards combined could take care of this building program, ambitious though it is; and with such a start in 1915-16, it would take relatively moderate appropriations in successive years to bring the navy to the desired strength and keep it there in the years to come; for Europe will be able to spare but little money for naval construction when the present war is over.—*Scientific American*, 25/9.

NAVY ESTIMATES FOR 1916-17.—Secretary of the Navy Daniels announced on October 18 that his official estimates for the next fiscal year, approved by the President, call for $217,652,173.32. The estimates for the navy provide for an increase of $67,990,308.44 over last year's appropriation, which amounted to $149,661,864.88. Under this recommendation of Secretary Daniels, the amount for construction is $95,372,127, including $8,000,000 for increase in munitions reserve, and $2,000,000 for aviation. Of this $57,003,000 is for new construction which will be recommended to the coming Congress; $8,000,000 for increase in munitions reserve; $2,000,000 for aviation, and $28,369,127 for continuing the program of new construction authorized by the Sixty-third Congress. "The Sixty-third Congress," said Secretary Daniels, "as will be recalled, authorized five battleships, 12 destroyers and 26 submarines—three sea-going and 23 coast defence, besides one fuel ship. This was the largest program ever authorized by any Congress and makes necessary the appropriation of $28,369,127 to continue such construction."

Secretary Daniels recommends to Congress, and will urge in his report, the adoption of a five-year program of new construction, providing for the expenditure during that period of $502,482,214 for construction of new vessels, munitions and aviation. The recommendation of construction and appropriations for this new work for the five years will be as follows:

SHIP CONSTRUCTION FOR FIVE YEARS

	1917	1918	1919	1920	1921	Total
Battleships	2	2	2	2	2	10
Battle cruisers	2	0	1	2	1	6
Scout cruisers	3	1	2	2	2	10
Destroyers	15	10	5	10	10	50
Fleet submarines	5	4	2	2	2	15
Coast submarines	25	15	15	15	15	85
Gunboats	2	1	0	0	0	3
Hospital ship	1	0	0	0	0	1
Ammunition ships	0	0	0	1	1	2
Fuel oil ships	0	1	0	1	0	2
Repair ship	0	0	0	0	1	1
Total	55	34	27	35	34	185

APPROPRIATIONS FOR FIVE YEARS

For New Ships	1917	1918	1919	1920	1921
Dreadnoughts	$15,560,000	$26,580,000	$37,600,000	$37,600,000	$37,600,000
Battle cruisers	11,158,000	11,921,000	17,500,000	17,118,500	23,460,500
Scout cruisers	6,900,000	6,350,000	10,000,000	8,650,000	10,000,000
Destroyers	10,500,000	16,900,000	10,100,000	10,300,000	13,600,000
Fleet submarines	4,425,000	5,577,500	5,437,500	4,215,000	3,400,000
Coast submarines	5,750,000	13,950,000	9,750,000	9,750,000	9,750,000
Gunboats	760,000	1,140,000	380,000	.....	380,000
Hospital ships	1,250,000	1,200,000	.....	.....	.....
Ammunition ships	.....	.....	.....	799,687	1,766,000
Fuel oil ships	700,000	655,250	.....	700,000	655,250
Repair ships	.....	.....	.....	.....	1,175,000
Total	$57,003,000	$84,273,750	$90,767,500	$89,133,087	$101,786,750
For completion of ships Previously authorized	$28,369,127	$20,149,000	.....	.....	.....
Total	$85,372,127	$104,422,750	.....	.....	.....
Aviation	2,000,000	1,000,000	$1,000,000	$1,000,000	$1,000,000
Reserve of munitions	8,000,000	5,000,000	5,000,000	5,000,000	2,000,000
Grand total	$95,372,127	$110,422,750	$96,767,500	$95,133,087	$104,786,750

Grand total for five years. $502,482,214.

President Wilson will urge Congress to adopt the five-year program of naval increase recommended by Secretary Daniels. This will be in addition to the annual appropriation of more than $100,000,000 for the upkeep of the navy, aggregating more than $500,000,000 in the next five years, exclusive of new construction; making a total proposed average naval appropriation each year of over $200,000,000. The grand total to be spent on the navy for the next five years will be as follows:

For 185 new ships	$422,964,087
For continuing ships already authorized	48,518,127
For aviation	6,000,000
For reserve supply of munitions	25,000,000
Total for increase	$502,482,214
For upkeep of the navy	515,000,000
Total for the navy for five years	$1,017,482,214

Of this grand total the official estimates for the navy, approved by the President, call for the appropriation of $217,652,173.32 at the coming session of Congress; an increase of $67,990,308.44 over last year's appropriation, which amounted to $149,661,864.88. The Sixty-third Congress authorized the construction of five battleships, 12 destroyers, one fuel ship and 26 submarines, three of which are to be of sea-going type and 23 of coast defence type.

Characteristics of Ships Proposed.—General characteristics of the battle cruisers planned contemplate ships nearly 800 feet long, between 90 and 100 feet in beam, and with six turbine-driven propellers, to make a minimum speed of 35 knots an hour. Even the new fleet of scout cruisers will not equal the battle cruisers in speed. The former will be designed to maintain for long periods a speed of 25 knots, endurance rather than excessive speed being the object sought. All of the new destroyers will make over 30 knots an hour, and one of the six for which contracts were let on October 18 will make over 32 knots.

Secretary Daniels Explains Program.—In announcing the program Secretary Daniels said: "The Bureau of Construction and Repair, owing

to the increased size and protection of the new battleships estimates that each dreadnought will cost, including armor and armament, $18,800,000. A portion of this increase may also be attributed to the greater cost of materials, which are higher than formerly, and, perhaps, abnormally high, owing to the great demand caused by the war in Europe. It may be that these prices will be reduced. If so, the Congress will not have to appropriate so much money. Then, again, the demand for materials entering into the construction of vessels may continue to be as great as or greater than at present, so that the estimates will not be too high. I have followed the estimates of the Bureau of Construction and Repair. The total cost of each of the other types of vessels recommended is as follows:

Battle cruiser	$17,500,000
Scout cruiser	5,000,000
Destroyer	1,360,000
Fleet submarine	1,500,000
Coast submarine	650,000
Gunboats	760,000
Hospital ships	2,450,000
Fuel ship	1,355,250
Repair ship	2,000,000

"In addition to the $8,000,000 to increase the reserve of munitions, I have recommended in the regular appropriations an increase of $1,178,980 for ordnance, in which I have included $480,000 for torpedo defence nets for battleships, and I have recommended also an increase of $286,000 for buildings for the storage of guns and munitions. The reserve on hand now fully occupies the present storage facilities, and it has been found necessary to have this increased space for storage to take care of the additional munitions which I have recommended.

Naval Militia.—"In addition to the regular new construction, I am asking for a separate appropriation of $250,000 for the purchase and repair of ships for the naval militia of Illinois and Minnesota. In both of these states the naval militia is well organized, and their efficiency depends, in each state, upon securing a proper ship for their cruising and practicing. After consultation with the governors and officers of the naval militia in these states I have made recommendation which it is believed will give these two states ships of a suitable character. I have in prospect the larger utilization of the older class of battleships for the naval militia organizations of the states on the seacoast. I have also recommended an increase in the appropriation for the naval militia as a whole of $60,737.33. The naval militia has made great strides this year, and it is the policy of the department to do everything in its power to increase the efficiency of the officers and men therein enrolled, who would make an excellent reserve in time of need.

Personnel Increase—Navy and Marine Corps.—"In order to provide a sufficient number of men to man the large number of ships of the navy which will be commissioned in the near future I have recommended an increase of 7500 sailors, 2500 apprentice seamen and 1500 marines, or 11,500 men in all. This number, it is estimated, will enable us to keep in full commission all battleships under 15 years of age, all destroyers and submarines under 12 years of age, one-half the number of cruisers, all the gunboats and the necessary auxiliaries for the fleet, as well as to provide adequate reserve complements for the remaining vessels of military value and for the shore stations, all of which accords with recommendations of the General Board.

"The great majority of enlisted men must, as apprentice seamen, pass through the naval training stations, where they are taught the rudiments of education and undergo preliminary training, lasting from four to six months, to prepare them for duties aboard ship. It has become necessary, therefore, owing to a larger number of men in the service, to increase the number of apprentice seamen in order to provide the flow of new men required to fill vacancies in the ranks as they occur.

"The increase in the marines is based on a 20 per cent of increase of enlisted men of the navy, and is required to provide for the usual marine complements of ships under construction as well as for advance base organizations for operation with the fleet. To officer these additional men it is recommended that there be appointed one brigadier general, to command the advance base regiments; two colonels, two lieutenant colonels, six majors, one colonel and assistant quartermaster, 14 captains, 14 first lieutenants, 13 second lieutenants, 15 warrant officers, six quartermaster's clerks, one paymaster's clerk, or 54 commissioned and 22 warrant officers. This increase in officers is in accordance with the established ratio between officers and men.

"There should also be an increase in the number of line officers to officer the ships soon to be commissioned, but as the Naval Academy is the only source of supply the increase recommended is in the midshipmen. Under the existing laws governing the appointment of midshipmen the Naval Academy will not be able to graduate midshipmen in numbers sufficient to officer the additional ships contemplated in the new program, and recommendations will be made to increase the number of midshipmen at the Naval Academy by not less than 250.

Flying Corps.—"The European war has shown the necessity for a skilled flying corps, whose members need not be experienced naval officers or educated as such, in view of which a special flying corps, to which expert civilian flyers may be appointed, has been recommended for the naval organization. This would establish a field for service for the increasing number of competent aviators willing to join such an arm of the service who cannot and could not hope, under prevailing conditions, to do so unless they either enlisted in the navy proper or graduated from the Naval Academy."—*Army and Navy Journal*, 23/10.

PERMANENT COUNCIL ON DEFENCE URGED AT BOSTON MEETING

BOSTON, MASS., Friday.

The establishment of a permanent council for national defence was urged as a primary measure of preparedness by speakers at a mass meeting held to-night under the auspices of the National Security League. About three thousand persons attended.

Governor Walsh and United States Senator John W. Weeks, both of whom advocated the defence council idea, said that its success could not be assured unless it were removed from political influence. Governor Walsh suggested that the council consist of the President, the Secretaries of War and the Navy, the presidents of the war college and naval college, other heads of military and naval forces, and the chairmen of the Ways and Means, the Military and the Naval Committees of Congress.

Senator Weeks recommended that the council should be made up largely, if not almost entirely, of officers of the army and navy, continued from one administration to another in such a way that a change of administration would have no effect on its activities.

Resolutions introduced by Mayor Curley, which were adopted unanimously, termed the question of national defence "the most vital issue now before the people of the United States," and urged upon Congress "the necessity of an immediate and thorough examination into the conditions of the armed forces of the country."—*N. Y. Herald*, 23/10.

RECENT MANEUVERS OF ATLANTIC FLEET.—The fleet maneuver of the Atlantic fleet, which began at noon October 4, ended at 8 a. m. October 9, with the umpire's decision that the hostile Red force had gained command of the sea and would be free to enter Delaware Bay by 6 o'clock p. m. October 9. The motive of this maneuver was to exercise the fleet, the department and the naval districts in the operations of defence against a hostile expedition directed toward getting a foothold on our Atlantic

coast, and for the purpose of the maneuver it was assumed that the coast between Eastport, Me., and Monomoy Point was not open to attack by the enemy.

No special effort was made to increase the number of ships available for the commander-in-chief of the Blue forces by commissioning ships now in reserve, by hastening the repairs to ships undergoing overhaul, or by diverting ships from important duties elsewhere. The Blue forces comprised 15 battleships, 16 destroyers, 12 submarines, a mining division and a number of auxiliaries. The Red force was in great part constructive, and was represented by the U. S. S. *Brooklyn* as flagship, three destroyers and five auxiliary vessels. At the beginning of the maneuver the Blue force was concentrated at Hampton Roads and a strong Red force was known to be about 1200 miles to the eastward of the Chesapeake Capes, escorting a large expeditionary force of troops in transports. The Blue forces were organized to scout for the enemy, and were disposed to meet and attack these transports before they could reach the coast. Details of the maneuver will not be available until report of the umpire has been received at the department, but it appears that the Blue scouts failed definitely to locate the enemy's main body or his convoy and that the Blue main force was itself located by the Red destroyers and subjected to a night torpedo attack, which cleared the sea of effective opposition to the Red movement and enabled the Red expedition to reach the Delaware.

In order that the department, its bureaus and offices might be exercised under war conditions, the department directed that from time to time the commander-in-chief of the Blue forces should report constructive happenings and casualties, and that the bureaus and offices of the department, as well as navy yards, should handle such constructive events in the same manner as would be done in the event of war up to the point of actual expenditure of money. Many constructive happenings were reported. As an instance, a constructive report was received from the U. S. S. *Wyoming* on the evening of October 5 that a violent epidemic of diphtheria on one of the battleships had broken out and that she had been sent to New York for disinfection and for a new crew of officers and men. This matter was taken up by the Bureau of Medicine and Surgery for the disposition of the infected crew, and the Bureau of Navigation took immediate steps toward the assembling of a relief crew of officers and men. Again, a constructive report was received from the U. S. S. *Wyoming* on the evening of the 7th that the *Wyoming* had been injured by ramming and that she was proceeding to Narragansett Bay. This matter was taken up by the Bureau of Construction and Repair and arrangements made for docking the *Wyoming* at New York.

During the period of the maneuver all bureaus and offices of the department had each constantly a responsible officer present in the department at night to handle any situation that might arise affecting the office concerned. It is proposed, with such maneuvers conducted in simulation of war conditions, to repeat and develop the exercise of all functions of the department, so that such rehearsals may finally be made to approach very nearly the condition of actual war.—*Army and Navy Journal*, 16/10.

THE ASSIGNMENT OF COAST GUARD CUTTERS.—The assignment of cutters for the winter's patrol comprises the *Ossipee* and the *Woodbury* for the stretch of coast lying between Eastport, Me., and Cape Ann, Mass.; the *Gresham*, the district from Cape Ann to Nantucket Shoals; the *Acushnet*, the waters of Vineyard Sound and Nantucket Shoals; the *Mohawk* and the *Seneca*, Gay Head to Delaware Breakwater; the *Onondaga*, from Delaware Breakwater to Cape Hatteras; the *Apache*, the waters of the Chesapeake; the *Seminole*, from Cape Hatteras to Charleston, S. C.; the *Yamacrow*, from Cape Lookout to Fernandina, Fla., overlapping in part the district of the *Seminole;* the *Miami*, from Fernandina to Key West, and thence to Tampa,

Fla., with headquarters at Key West; the *Tallapoosa,* from Tampa to New Orleans, with headquarters at Mobile, and the *Windom,* from New Orleans to Rio Grande, with headquarters at Galveston.

In addition to the above the cutter *Pamlico,* with headquarters at Newberne, N. C., will have the district comprising the waters of Albemarle and Pamlico sounds.—*N. Y. Herald,* 15/11.

NAVIGATION

PREVENTING FOG WITH OIL.—At the suggestion of the officer in charge of the Branch Hydrographic Office, New Orleans, attention is called to the possible value of oil as a preventive of fog. It is reported that experiments have been made in France with variable success to prevent the fogs in river valleys, the best results being obtained by employing vegetable oils. This covered the surface with a thin film of oil which kept the air from coming in direct contact with the warmer water and thus hindered the condensation of the water vapor.

It may well be that a ship which has to stop or anchor off a fogbound coast can create a clear zone around her by distributing storm oil for a time.

The Hydrographic Office would be glad to hear from those who make the experiment and from any who may already have had experience in this line. Careful note should be made of all the conditions, such as the character of the fog, temperature of air, temperature of sea water at surface, state of the sea, direction and force of the wind, method of employing oil, kind and amount of oil used, and how much headway, if any, the ship had; then report whether the oil appeared to spread well, how long it was applied, and what effect it had on the fog. [From Hydrographic Bulletin No. 1356, August 25, 1915.]—*Shipping Illustrated,* 2/10.

NAVASSA ISLAND LIGHT.—The light station proposed for Navassa Island, in the Caribbean Sea, will, according to *Concrete and Constructural Engineering,* be constructed by the United States Lighthouse Service, and will be on the southern side of the island. The tower will be cylindrical, of reinforced concrete, supporting a cylindrical helical bar lantern with a focal plane about 152 feet above its base and 402 feet above sea level. The illuminating apparatus will consist of two four-sided fourth-order lenses, mounted side by side, with their sides parallel with each other, and carried on a mercury float. The two parallel beams of light from the lenses combine to form a single beam of about 56,000 candles. The characteristic will be a double white flash every 30 seconds. The range, due to the height of the light, will be about 27 nautical miles.—*The Engineer,* 22/10.

ORDNANCE AND GUNNERY

THE WEAR OF GUNS.—An article in a recent issue of the *Revue Générale des Sciences,* which deals with the wear of guns due to firing, states the following points: (a) Wear is *nil* in the powder-chamber; (b) wear increases with the temperature of combustion of the powder constituting the charge. The erosive action of ballistites containing 50 per cent of nitroglycerine is much greater than that of pure nitro-cellulose powders. The difference decreases with the percentage of nitro-glycerine contained in the ballistite or cordite; (c) for a given gun, firing a projectile of a given weight at a given pressure, wear increases with the weight of the powder charge; (d) if similar guns similarly charged be compared together, wear increases with the caliber; (e) at the starting-point of the rifling, the diametral wear at the top of the rifling, the land, is greater than that at the bottom of the grooves, but the bottom of the grooves is also much worn when the land shows heavy wear. At the muzzle, however, the diametral wear at the bottom of the grooves is negligible compared with

that at the land. Gradually, as the gun wears, there is formed on the surface of the bore a large system of very fine cracks, which are closest together at the point of maximum pressure. At the same time the surface of the bore becomes so hard that it can hardly be attacked with a file. Osmond has shown that the change in structure which occurs is due to a cementing action on the steel. From the point of view of ballistics these phenomena have for consequence a decrease in muzzle velocity and in the maximum pressure, the result being a loss in accuracy. After reviewing the investigations carried out by Daubrée, Osmond and Vieille on the subject, the author of the article referred to concludes that the wear of guns is due to the efflux at high speed of gas through the space or gap existing between the rifling band of the projectile and the bore of the gun. The gap is due to the elastic dilatation of the gun produced by the pressures which are developed inside it. Wear at any portion of the bore depends directly upon the thermal flux which penetrates it during the very short time when the rifling band of the projectile is directly opposite it. As our readers will remember, we dealt exhaustively with this subject in our series of articles on the "Life and Power of Heavy Ordnance."—*Engineering*, 22/10.

REPORT ON NAVAL ORDNANCE.—The report of Rear Admiral Joseph Strauss, U. S. N., Chief of the Bureau of Ordnance of the Navy, covers the fiscal year ending June 30, 1915. It appears that in addition to the work of arming the new dreadnoughts and lesser units of the fleet, the routine work of replacing and relining guns on vessels afloat is proceeding according to schedule. The new 14-inch guns are particularly the equals of the 15-inch guns placed on principal ships abroad, with the additional advantages of flatter trajectory and greater volume of fire. A 16-inch gun has also been tested. We are gradually accumulating the required reserve of powder, says the report. Our reserve of shell, however, requires to be brought up to standard.

The replacement of 5-inch 50-caliber Mark V guns afloat has been completed and the relining of the spare guns is being proceeded with and will be completed in about a year, thus making all these guns good for 3000 foot-seconds initial velocity. The work of relining and replacing turret guns has progressed satisfactorily and the replacements for the battle fleet have all been completed; there remain only a few armored cruisers to have their turret guns replaced. The 5-inch cartridge-case guns of the *Arkansas* have been replaced and those on the *Wyoming* will be replaced this autumn by bag guns. The 5-inch 50-caliber guns of the *Delaware* and *North Dakota* have been replaced by the latest type 5-inch 51-caliber guns; thus all battleships, from the *Delaware* class on, have the same type guns for torpedo defence and use the same ammunition. The replacement of all 3-inch rapid-fire guns with breech mechanisms fitted with eccentric firing pin has been completed and the modification of all spare guns is nearing completion.

The work of assembling reserve batteries is progressing satisfactorily and is practically completed except for the 3-inch batteries whose guns are being relined and fitted with new mechanisms. The bureau is continuing its investigations on the subject of erosion and is testing and investigating all promising schemes submitted. All Colt automatic machine guns have been modified to take service ammunition. Slight changes were found to be necessary to make the Benét-Mercie gun efficient, and these changes have been made, with the exception of a few guns recently shipped from vessels on distant stations.

With the object of keeping pace with the increased range of modern naval warfare the bureau has increased the power of the 14-inch guns for the *California*, *Mississippi* and *Idaho* by increasing the length of the gun to 50 calibers and enlarging its chamber capacity. In order that these latest additions to the navy should carry the highest type of artillery the bureau took the bold step of ordering their guns without manufacturing a trial gun.

The bureau's confidence in its design has been fully justified. The first gun proved not only gave the designed velocity and pressure exactly, but its additional longitudinal strength which has been provided for has resulted in these guns having less droop than any guns of large caliber heretofore produced. As it stands these guns, although of lesser caliber and weight than the 15-inch guns now mounted abroad, are capable of penetrating the heaviest side armor at oblique impacts and at the greatest effective battle range, and give us the advantage of flatter trajectory, with greater volume of fire due to the increased number that we are permitted to mount on any ship of equal displacement. In August, 1914, a type 16-inch gun of 45 calibers length was tested. This gun fulfilled the highest expectations of its design, and the bureau believes it to be as powerful a gun as is in existence to-day.

Preparation of anti-aircraft guns likewise has proceeded. The bureau has designed and built a 4-inch 50-caliber anti-aircraft gun and mount. It has been proved and found to be highly satisfactory. Three-inch 50-caliber anti-aircraft guns and mounts are being manufactured for the battleships. The bureau's design of 3-inch submarine gun and mount has passed successful tests at the proving ground, and it remains only to observe its behavior in service. On submarines after the *M* class this mount will be modified to give greater elevation for use against aircraft. A 1-pounder aircraft gun has been designed, and the bureau expects to increase the caliber as soon as the first gun and mount have been completed. Experiments with this gun will provide data for the further improvement of such artillery.

Director installations have been made on the *Michigan, Delaware, South Carolina, Utah, Florida, Arkansas, Wyoming, New York* and *Texas*. It is proposed to fit this installation on all other turret ships back to and including the *New Jersey* class, and in all ships building. As this system does not interfere in any way with the present gear it is believed to be a valuable adjunct at present, in that it undoubtedly provides a means of obtaining fairly accurate results in very heavy weather, or in smoke, spray, or gases, when the present system would be admittedly unsatisfactory. Further development after experience may enhance the value of the system.

During the past year contracts have been let for armor-piercing, common, and target projectiles, in accordance with the needs of the naval service and within the limitations of the funds available for the purpose of purchasing projectiles. Considerable experimental work has been conducted for the purpose of developing a satisfactory design of anti-aircraft projectile, for the purpose of improving the armor-piercing type of projectile, and in connection with the type of projectile carrying a large amount of high explosive for which armor-piercing capabilities are sacrificed. The results strengthen the views long held by the department as to its preference for armor-piercing projectiles carrying high explosive. The increase of 700,000 pounds in the total output of new powder during the fiscal year 1915 over the fiscal year 1914 is not due to the increase in the powder factory authorized by Congress but to improved methods of operation. Owing to the abnormal rise in the cost of all raw materials entering into the manufacture of powder on account of the war, the cost of the powder now being manufactured is considerably higher than the cost of powder for the last fiscal year, the raw materials for which were nearly all contracted for before the war. The facilities for the production of smokeless powder and other explosives in the United States have been enormously increased owing to the demands of the belligerents for these materials. It has taken many months of time and enormous expenditures of money to develop these facilities, and their conservation for the benefit of the United States Government in time of war is a problem which will require the most careful consideration of the department when the European War is over and the present demand from abroad has ceased. The development of machines for regularly piling the grains

of powder charges has been successful, and the service 14-inch charges of the *Oklahoma* and *Nevada* have been put up with grains regularly piled. It is the intention to regularly pile service powder charges for all 14-inch guns and later to extend this practice to the charges for the 12-inch 50-caliber and 12-inch 45-caliber guns.

The cost of many of the materials of a strictly military character has enormously increased owing to the demands for these materials by the belligerents, and the bureau has frequently been confronted with the absolute necessity of paying "war prices" for such materials. This has applied with special force to high explosives for torpedoes, mines, and projectiles, the prices for which have been from two to four times the normal peace-time prices. As a partial relief from this situation, steps have been taken to install a small plant for the manufacture of high explosives for projectiles at the naval powder factory, Indian Head, and it is expected that this plant will be in operation about December 1. The bureau has adopted a policy of thoroughly inspecting the ammunition of ships whenever they go to a navy yard for repairs and undertaking such overhaul of the ammunition as may be required.

On the question of armor, the report remarks that contracts for approximately 24,500 tons, required for battleships Nos. 40, 41 and 42, have been let, and about 4330 tons of this armor have been delivered. It is estimated that the work on this armor has progressed to about 50 per cent of completion, and it is probable that all deliveries will be completed by the date on which the vessel for which the armor is intended is launched. The last of the new conning towers has been installed, and now all battleships subsequent to the *Virginia* class are equipped with modern combined fire-control and conning towers. The experimental firing at inclined impacts has been continued during the past year, and a formula for penetration after oblique impact has been adduced which is considered accurate within reasonable limits.

At the three plants where torpedoes are now manufactured, 1602 of these projectiles are under construction. The manufacture of torpedoes at the Washington Navy Yard is progressing very satisfactorily. The bureau will place an order with the Washington Navy Yard for 96 additional torpedoes. The bureau hopes to manufacture about 100 torpedoes per year at that yard. The manufacturing plant at the torpedo station will be about doubled by January 1, 1916, and after this year the output of the station should be about 300 torpedoes per year. The torpedo station now has orders for 590 torpedoes, as compared with 290 one year ago. Almost 220 torpedoes were issued, as against 163 last year. The number of torpedoes lost was 48 and 20 were condemned. During the last year the bureau has replaced torpedoes on 12 battleships and five destroyers with later marks of torpedoes.

The *Montana* has been performing most efficient work in training torpedo personnel, both officers and men, and in conducting experiments with torpedoes and tubes as outlined by the bureau. It is absolutely necessary to have a well-trained torpedo personnel in order to obtain satisfactory results with modern long-range automobile torpedoes. This vessel should not be diverted from this duty except in cases of great emergency.

The Norfolk Navy Yard is now well established in the manufacture of mines. It will have delivered the first half of its entire contract by October, and by that time the rate of manufacture will be doubled and the bureau will have the entire number of mines called for in the department's scheme in the early spring. Ships have already been outfitted with this new type of mine and it is found to be wholly satisfactory. In order that destroyers may at all times have one air compressor for charging torpedoes it is considered absolutely necessary that each destroyer be provided with two air compressors; this will require the purchase of 46 additional air compressors. A mining division has been formed in the fleet. All capital ships are being provided with sweeping sets. All destroyers are being fitted for

sweeping. A mine sweeping manual has been prepared and submitted to the fleet for comment. A list of steam fishing vessels of over 100 tons has been prepared and their owner communicated with, and arrangements have been made for their inspection with a view to their utilization as mine sweepers in time of war. These vessels are now being inspected. Recommendations have been made and approved that six gunboats be fitted for mine sweeping.

Considerable trouble in the delivery of target practice ammunition to ships has been avoided by ordering this ammunition before a regular scheduled visit of the ships to their home yards and having it delivered during a general docking and overhaul period. Ammunition for subcaliber drills has been supplied to division flagships and flotilla tenders in the Atlantic fleet with a view to filling vessels' shortages promptly, without the necessity for numerous small orders and shipments for individual vessels.

Plans have been prepared and instructions issued for the mobilization at various navy yards of all guns loaned to naval militia organizations, exclusive of guns on vessels loaned to naval militia. These plans are to provide for making these guns available for mounting on merchant vessels with the least amount of delay.

Developments in fire-control during the fiscal year ending June 30, 1915, have been along the same lines as during previous years, with added emphasis attaching to developments of methods of keeping the range. As the fighting ranges increase, the necessity of a simple yet efficient means of keeping the range becomes more pressing, and the bureau has experimental instruments under construction which it is hoped will aid materially in the solution of this problem. Larger range finders mounted in turrets are proving satisfactory and give more consistent results than those mounted in the open, due to their protection from sudden changes of temperature. All turrets of new ships are being equipped with range finders, and the type of visual transmitting system adopted for use with the range finders on the *California* class is believed to be an improvement over previous systems as regards reliability and legibility of indications. Experiments have been conducted during the year with the Fiske horizometer, with the idea of obtaining data as to the relative efficiency of an instrument using a known vertical height on a distant object as a base line, as compared to the self-continued range finder. Sufficient data have not yet been collected to determine the advisability of supplying the horizometer as part of the fire-control outfit of the battle fleet.

The special board on naval ordnance has studied and examined 656 ideas and inventions which have been suggested to it. This bureau has proposed to the department to establish at a more suitable place a proving ground for long-range firing and fuse work. The necessity for this is paramount, and the establishment of such a range should no longer be delayed. A marked increase in the amount of experimental work is noted for the year. The experiments embrace tests of high explosives, inventions, methods of protection, high-angle fire, and, in all, some 40 original investigations not connected with the general work of the proving ground. The manufacture of mixed acid and sulphuric acid has been so successful as to warrant the extension of the plant for the production of these essentials. We should by all means manufacture our own acid at the powder works and have ample stores of the raw material always on hand. Forty-seven accidents were reported at the proving ground and powder factory for the year. One of these accidents, a fuse explosion, caused the death of a valued employee. The other accidents were not of a serious nature.—*Army and Navy Journal*, 13/11.

DARDANELLES LOSSES.—*Were Battleships Sunk by the Leon Torpedo?*—The losses of the French battleship *Bouvet*, and of the two British battleships *Irresistible* and *Ocean* in the Dardanelles have been attributed by

some to the use of the Leon torpedo, which is a weapon of warfare combining to a certain extent the characteristics of the submarine mine and of the automobile torpedo. We are again indebted, says *Engineering*, to our excellent contemporary *Le Génie Civil* for the following particulars which have been extracted from its issue of August 7.

The Leon torpedo was the invention of a Swedish officer, Captain Karl Oscar Leon, who took out a patent for it in 1907. Since that time it has undergone certain modifications in detail. The general principles on which the apparatus works have, however, not greatly changed. The torpedo can, if required, be launched by simply placing it in the water or in the same manner as is an ordinary torpedo, but it has not, like the latter, any horizontal movement. All it can do is to oscillate up and down in a vertical direction or if required maintain itself at a given depth below the surface of the water. When first introduced the motive power to drive the mechanism necessary to give the torpedo this attribute was compressed air. This was contained in a vessel provided with specially designed valves, which opened when the water pressure on them increased and closed when it diminished. These valves either allowed the air to be admitted to or to escape from a flotation chamber which thus produced the up-and-down oscillation of the torpedo between two predetermined levels.

In the present-day apparatus, however, the oscillating movement is brought about by means of an electric motor. The torpedo, which ordinarily has a body about 5 feet 2¾ inches long by about 1 foot 8¾ inches in diameter, is divided into two compartments, which are separated. The upper compartment contains the explosive and the firing apparatus, which is housed in a central tube. The lower compartment is itself sub-divided into two compartments, the upper of which contains a battery of accumulators, and the lower the machinery. The weights are so arranged that the torpedo when it is submerged always holds itself vertically, a chamber filling itself with water and giving the mine a tendency to sink. The speed with which this chamber fills, and consequently the rate at which the torpedo sinks, can be controlled by a valve which can be opened to the required extent. Even when the reservoir is full, however, the torpedo is as a whole only just heavier than water, so that it does not in any case sink rapidly. When a certain depth has been reached—and this depth can be varied within certain limits—the pressure of the water outside the torpedo acts on a very sensitive hydrostat which is arranged to close—or open—a switch connecting the battery to an electric motor which drives a propeller at a speed of 200 revolutions per minute. The effect of this propeller, when it is set in motion, is to produce a vertical thrust on the torpedo, so that the latter commences to ascend towards the surface of the water. When a point within, say, 5 feet of the surface has been reached, the pressure on the hydrostat has been reduced to such an extent that the motor switch is opened, the motor stops, and the torpedo again begins to sink. The hydrostat can be so adjusted that the maximum immersion may be maintained within the limits of between 5 feet and 10 feet from the surface. The electric arrangements are such that the battery cannot be short-circuited or damaged when the torpedo is being launched, and that the motor revolves at practically a constant speed until the battery is exhausted.

In addition to the mechanism already referred to mention must also be made of a clockwork device by means of which it is possible either to confine within certain limits the duration of time that the torpedo is to remain active—the electric current being interrupted at the end of that time—or, on the other hand, to delay the time at which the torpedo is to become active. In the latter case the motor switch is only closed at the end of that time, the torpedo in the meanwhile remaining at the bottom of the water. The apparatus is also furnished with what has been termed a "stabilizer," which allows of compensation being made for different densities of water. This stabilizer consists of a cylinder which is in com-

munication with the outside water, and which is provided with a water-tight piston, the position of which can be regulated by means of a screwed spindle. In this manner more or less water can be allowed to enter the cylinder, so that the flotability of the torpedo can be adjusted to suit the density of the water in which the apparatus is used.

The Leon torpedo can be employed in various ways. It can be used for protection by one squadron flying from another which is more powerful, or to attack tidal ports. In this case the torpedoes are launched when the tide is flowing and they would then travel in with the ingoing water. If the estuary to be traversed be long, the clockwork mechanism can be arranged to come into play after an interval, so that when the tide turned the torpedo might sink to the bottom, only to rise once more when the flow began again. It is also possible to arrange the mechanism in such a way that the battery may only be connected to the motor at the end of a given period, so that the torpedo would then come to the surface and remain there until the battery had run down.

For use in practising with this torpedo it is customary to provide a reservoir of compressed air which is connected with the flotation chamber by means of a valve. This valve is controlled by the clockwork mechanism which, at the end of a given period, permits air to flow into the chamber, and drive out the water. In this way the torpedo is made to rise to the surface and can be secured.—*Naval and Military Record*, 8/9.

ACCURACY OF FIRE

THE PRINCIPAL CAUSES AFFECTING THE FIRE OF BIG GUNS

In an article in *The Engineer*, Captain H. J. Jones, inspector of ordnance machinery of the British Army discusses the factors affecting the accuracy of fire and range of big guns, and gives some causes that will explain the apparent haphazard shell fire that we read of in the reports from the war, and why the shots from big guns so frequently miss their mark.

BALANCED ERRORS.—(1) *Whip*.—The whip or transverse vibration of the muzzle portion of long guns may be the source of very large errors. It becomes pronounced with 50-caliber guns, particularly if they lack girder stiffness. The droop of a 12-inch 50-caliber gun is from 0.3-inch to 0.4-inch, and its cantilever stiffness such that it makes from 130 to 150 complete vibrations per second. The velocity of the center of the muzzle across the line of departure arising from this vibration may be as high as 50 feet per second with wire-wound guns. Assuming the mean velocity along the rifling to be about 1800 feet per second, we see that there will be about three complete vibrations of the muzzle while the projectile is in the gun. The projectile may leave the bore with the center of the muzzle in any position between its limits of vibrational displacement, and the error in the angle of departure is thus quite indeterminate and fortuitous, and the error of range symmetrically disposed about the mean.

(2) *Firing Interval*.—This is the interval between the layer pressing the trigger and the projectile leaving the bore. With moving gun platforms it is the main cause of inaccurate shooting. The firing interval is made up of two parts; one, from 0.08 to 0.13 second, during which time the tube is fired, the charge ignited and the band engraved, and the other, from 0.022 to 0.035 second, representing the time of travel of the projectile along the rifling. In other words the firing interval for a modern 12-inch is, on the average, about 0.122 second. These figures, however, may be greatly exceeded with defective tubes and firing arrangements.

Modern battleships have a metacentric height of from 3.5 feet to 4.5 feet and a period of about 8 seconds for a single roll of 5 degrees. This is equivalent to a maximum angular velocity of 15 minutes of angle per 0.10 second. Hence, if we assume that the layer does not alter the elevation

between the instant of pressing the trigger and the projectile leaving the bore, the average firing interval means a possible error with the 12-inch of 16.3 minutes elevation. Since 1 minute alteration of elevation at 10,000 yards corresponds to about 15 to 20 yards on the water, we see that, due to a moderate roll of 5 degrees, every round may be a miss, although the marksmanship of the layer be perfect. Under such conditions, firing for individual hits is the merest futility; firing by salvo becomes imperative.

(3) *Air Spacing.*—When using reduced charges a considerable space exists between the end of the charge and the base of the shell. Wave pressures are likely to be set up, giving rise to irregular burning and irregular muzzle velocity.

(4) *Propellant.*—The acceptance limits of a lot of new powder define the probable variation of muzzle velocity from round to round. These limits become extended when lots of varying ages of different makes are in use, and speaking generally, the mean velocity from any one lot shows a progressive fall with age.

(5) *Projectile.*—Those qualities of projectiles which affect the ballistic coefficient—size, weight, balance, etc.—will vary from round to round. The limits of variation are determined mainly by questions of expense in manufacture and inspection.

(6) *Steadiness.*—The coefficient of steadiness is affected by the position of the driving band, the position of the center of gravity with relation to the center of form, the speed of rotation, initial centering, and the actual gun elevation. Projectiles in the descending branch of high-angle trajectories become increasingly unstable as the elevation is increased.

SYSTEMATICALLY LOADED ERRORS.—(1) *Laying.*—As a rule layers have a personal prejudice for laying either high or low, and in a bad light, in rain and mist, or when fatigued, excited or impatient, they tend to exaggerate their specific defect. All laying depends on the personal judgment of the layer—the attainment of a state of mental satisfaction, in which a condition of equilibrium is established between the feeling that "that is near enough," and the adjustment of muscular effort required to make it nearer. Most heavy guns are more easily depressed than elevated, and when following a target in a seaway the gun tends to take charge in depression and is a very fatiguing mass to control in elevation. When laying by clinometer, if the bubble be very lively, the layer becomes impatient, whereas if the bubble be sluggish the error of elevation depends on whether the last motion of setting be in elevation or depression.

(2) *Jump.*—Jump is very considerable with field carriages on bad ground, and in the case of naval mountings varies not only with the same mounting in different parts of the ship, but also when the gun is trained on different bearings. Mountings carried on a pedestal with a ball race of small diameter, particularly if they are balanced mountings, are extremely unstable, the jump varying between positive and negative limits of as much as half a degree. Errors of elevation with these mountings are also caused by the movements of the gun members on the platform and by the tilting of the mounting by the thrust at the elevating arc. With hydro-pneumatic mountings the recoil and angle of departure are greatly affected by the mere rate of fire, the frothing of the liquid and the liberation of air being dependent on the time interval of rest between the rounds.

(3) *Dials.*—The dials are graduated from a calculated range table that has been correlated to the shooting of one or more guns of the particular nature. Any individual gun, however, may range consistently short or over, due to some peculiarity not possible to define.

(4) *Instruments.*—There are a considerable number of instrumental errors which arise mainly from imperfect adjustment, such as telescopes out of collimation, displacement of the zero reading of dials, range finders out of level or incorrectly datumed, tide gages incorrectly set, etc., that give a permanently loaded error to the shooting of the gun.

UNBALANCED ERRORS.—(1) *Droop.*—This is caused by the heat strains of unequal cooling during manufacture or by a lack of girder stiffness. In both cases perceptible modifications of the droop are brought about during firing or by the heating effect of mere sunshine. Cases have been met where the bend of field guns is beyond the condemning limit when measured in the gun park, but four or five minutes less after the guns had been heated by exposure to a tropical heat for three hours.

(2) *Choke and Metallic Fouling.*—The effect of choke and metallic fouling is not only to increase bore resistance and thus cause variable muzzle velocities, but also to make one gun differ from another of the same nature at the same period of its life. The effect depends on whether the choke or coppering occurs in such a position that the rate of burning of the charge is affected by lowering the normal rate of expansion of the bore gases. Heavy guns which copper rapidly may lose as much as 50 yards per round at 5000 yards.

(3) *Driving Band.*—When projectiles are fired for recovery their driving bands are found to be fanned, eccentric, worn smooth or multiply engraved. This irregular action implies variable engraving and rifling resistance, and, in consequence, variable muzzle velocity. In addition, with long shell or with a gun eroded at the commencement of the rifling oblique loading results, and heavy groove marking on the body of the shell itself.

(4) *Wear and Windage.*—Wear at the commencement of the rifling gives rise to over-ramming and to an engraving resistance less than that normal for a new gun. Heavy guns have a rapid rate of wear and rapid rate of fall of muzzle velocity for about the first eighty rounds of their life, a feature that is not exhibited by guns below about 5-inch caliber, these latter having a gently diminishing rate of fall of muzzle velocity throughout their life. General wear of the bore gives rise to gas escape, fusing of the driving band, irregular rotation and a fall of muzzle velocity.

(5) *Wet Chamber.*—This is a fruitful cause of lack of agreement between performance and intention. When charges are burning in a gun the principal mode of heat loss to the walls is by radiation. The magnitude of this heat loss is not generally appreciated, although it is of the order of 10 per cent of the total heat of combustion. The most important practical fact to remember, however, is that the rate of absorption of radiant heat greatly depends on the mere condition of the surface, differences of polish or of wetness hardly perceptible to the eye causing a considerable change in the rate of heat transfer. Water in the chamber affects the ballistics in two ways. Water being opaque to radiant heat reduces the initial heat loss to the walls by radiation, and water left in the chamber after sponging out absorbs heat on being converted into steam. The initial greasiness of the gun, in its effect on radiation, may explain the "mystery" of the first round. The quantity of water left in the chamber depends largely on the drill, and also on the shape of the chamber and the elevation of the gun. Quick-firing guns with fixed ammunition are not liable to this source of error.

(6) *Ramming.*—Just as an over-rammed projectile causes a loss of muzzle velocity, so also does the slipping back of a projectile cause a rise of muzzle velocity. A 6-inch shell, slipping back 6 inches, may be expected to give a maximum pressure of 1.5 ton above the normal and an increase of muzzle velocity of about 60 feet per second.—*Scientific American, Supplement, 6/11.*

ENGINEERING

DESCRIPTION AND TRIALS OF THE U. S. TORPEDO-BOAT DESTROYER "ERICSSON."—The U. S. torpedo-boat destroyer *Ericsson*, No. 56, is one of six destroyers of the same class authorized by an Act of Congress approved on August 22, 1912. The contract for the *Ericsson*, signed on December 16, 1912, called for delivery within 24 months, the contractors being the

New York Shipbuilding Company, of Camden, N. J., and the contract price $873,500. A speed of 29 knots at about 1090 tons displacement, with the main engines developing about 17,000 S.H.P., was specified. Mr. W. H. A. Lange, in a paper communicated to the American Society of Naval Engineers, gives the principal dimensions of this vessel as follow:—

Length on load waterline	300 ft. 7 in.
Length overall	305 ft. 3 in.
Breadth on load waterline	30 ft. 6 in.
Breadth over guards	31 ft. 1 in.
Draft, mean	9 ft. 9 in.
Displacement, normal	1,090 tons
Tons per inch immersion at normal draft	14.5
Area immersed, midship section	204 sq. ft.
Block coefficient	.427

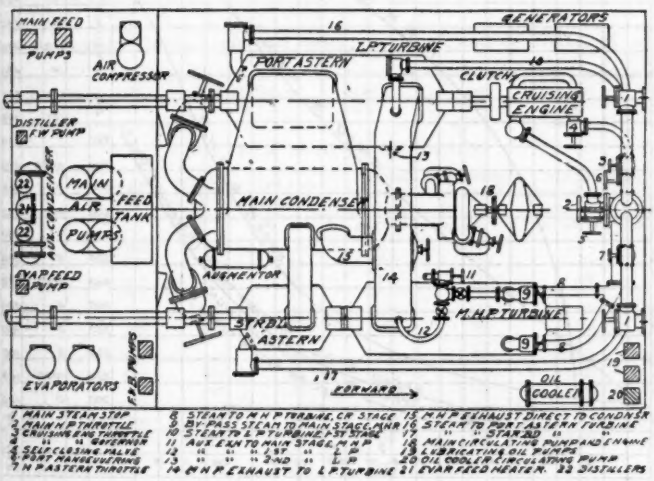


FIG. 3.—Arrangement of Propelling Machinery, U. S. S. *Ericsson*

The general arrangement of the propelling and auxiliary machinery is shown in Fig. 3. A vertical, inverted, direct-acting, compound reciprocating engine is arranged forward of the low-pressure and astern turbine, on the port shaft, and the main high-pressure ahead turbine and an independent astern turbine are mounted on the starboard shaft. A disconnecting clutch, of the Metten hydraulic type, is interposed between the cruising engine and the l.-p. turbine for cruising speeds up to 16 knots. When speeds greater than this are desired, the clutch is released without stopping the engine. Steam is supplied from four White-Forster oil-burning water-tube boilers.

An interesting feature in connection with the arrangement of valves and piping to the reciprocating engine is that, should the pressure of oil on the clutch diaphragm suddenly drop, the throttle of the reciprocating engine automatically closes instantly, thus preventing this engine from racing. Steam cannot be admitted to the astern turbine on the same shaft while the reciprocating engine is in use, neither can the throttle to the reciprocating engine be opened while the port astern turbine throttle is open. By a slight movement of the handwheel on the cruising-engine throttle, through an arc of 30°, the astern throttle is locked in the closed position and the oil

cock opened, full pressure thus being applied to the clutch, which engages instantly, and to the governor valve of the reciprocating engine, placing it in a position for immediate action in case of emergency. The clutch is not again released until the throttle valve is closed. Steam can be admitted to the l.-p. ahead turbine on the same shaft while the cruising engine is in use.

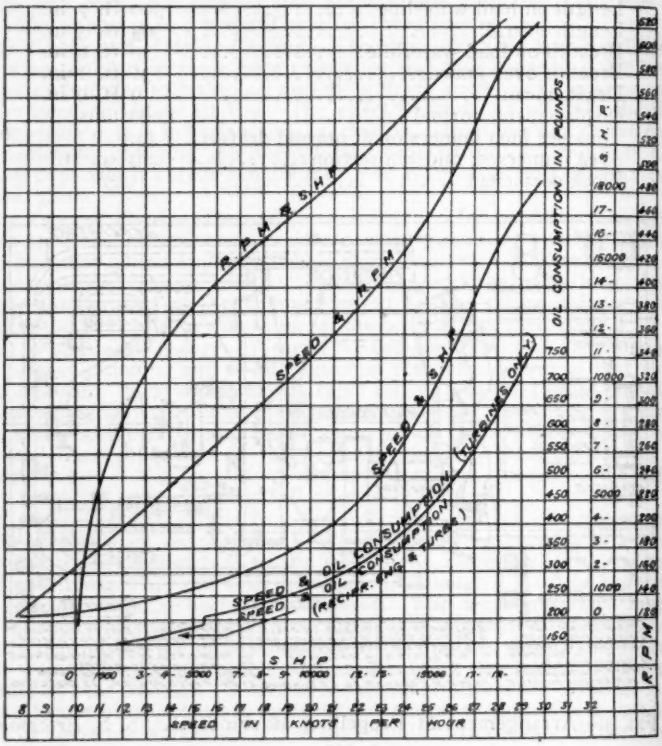

R.P.M. & S.H.P.
SPEED & R.P.M.
SPEED & S.H.P.
OIL CONSUMPTION (TURBINES ONLY)
SPEED & OIL CONSUMPTION (RECIPR. ENG. & TURBS.)
SPEED & OIL CONSUMPTION
OIL CONSUMPTION IN POUNDS
S H P
SPEED IN KNOTS PER HOUR

FIG. 4.—Standardization Trials, U. S. S. *Ericsson*

The results of the standardization trials are shown in Fig. 4, and of four 4-hour trials and one 2-hour trial in Table I.

TABLE I.—OFFICIAL TRIALS, U. S. S. "ERICSSON"

	Four-hour Trials				Two-hour Trial
	Full-power	24-knot	15½-knot	12-knot	15½-knot
Displacement, tons	1,087.1	1,097.8	1,089.2	1,096.3	1,100
Steam pressure at boilers, lb.	259.44	250	245.63	248.13	243.75
Vacuum in condenser, in.	28.18	29.20	27.94	28.88	29.21
Revs. per minute, mean	616.02	433.32	260.39	198.62	258.85
Speed of ship, knots per hour	29.29	24.115	15.448	12.056	15.493
Slip of propellers, per cent.	25.86	13.24	5.29	5.20	6.58
Shaft horse-power, total	17,151	7,150	1,099	420	1,131

EFFICIENCY OF TALBOT BOILERS.—We reproduce below a test sheet showing the performance of a Talbot boiler, just delivered, for one of the submarine picket boats of the U. S. battleship *Arizona*. The results indicated below are sufficiently eloquent in themselves, but other wonderful things can be done with the Talbot boiler, such as taking tubes out when the boiler is working under 300 pounds steam pressure without blowing down and replacing the tube thus taken out with a new one. This, in addition to the all-round efficiency, compactness and light weight of the boiler, makes it well worth the while of every one interested in the operation of steam vessels to investigate the merits of the Talbot boiler which is sold and manufactured by the Talbot Boiler Co., 120 Liberty Street, New York City:

TEST OF TALBOT BOILER—NUMBER 1, TYPE "I"

At Olean, N. Y., Sept. 3, 1915

BOILER DATA: Length, 54 in.; width, 36 in.; height, 71 in.; weight of H. S. and jacket, 3800; steaming weight, 4000; weight (with skids), 4285.
COLD WATER PRESSURE TEST: 2000 per sq. in.
SHIPPING WEIGHT: (Boxed) 4900.
HEATING SURFACE: Inside surface of tubes, 290 sq. ft.; outside surface of tubes, 350 sq. ft.
RESISTANCE: Through boiler tubes, 85; total through boiler valves, 165; total, 250.

Temperatures	Atmosphere	Stack	Steam	Water	Oil
Degrees F.....	68	350	610	45	53
Gauge pressure....	..	...	250	500	120

FIFTEEN MINUTE READINGS

Time of readings	Weight of water in lbs.	Weight of oil in lbs.	Oil consumed during period	Actual evaporation during period	Equivalent evaporation during period	Actual evaporation per lb. of oil	Equivalent evaporation per lb. of oil
3.45 P. M.....	1208	660	..	...	...	.....	.....
4.00 P. M.....	830	626	34	378	508	11.05	14.40
4.15 P. M.....	435	593	33	395	530	11.95	16.00
	1277	...	..	...	...	.....	.....
4.30 P. M.....	862	561	32	415	557	13.00	17.40
4.45 P. M.....	459	527	34	403	540	11.85	15.55
	1290	...	..	...	...	.....	.....
5.00 P. M.....	895	495	32	395	530	12.35	16.55
5.15 P. M.....	502	462	33	393	527	11.90	15.80
5.30 P. M.....	103	428	34	393	527	11.75	15.75
	1264	...	..	...	...	.....	.....
5.45 P. M.....	870	395	33	394	528	11.50	15.50
6.00 P. M.....	469	362	32	401	537	12.20	16.38
Totals and average	...	2573	298	3567	4800	12.00	16.10

Total heat of the steam from 32 deg. F., 1317.6 B. T. U. per lb.
Total heat supplied by the boiler, 1304.6 B. T. U. per lb.
Superheat, 204 deg. F.
Latent heat, 970.4 B. T. U. per lb.
Factor of evaporation, 1.34.
Test conducted by Paul A. Talbot.
Assisted by E. A. Spruce, J. O. Werner.
Witnessed by W. P. Clark, J. S. Reid, J. M. O'Connor, D. H. Schwartz, S. E. Albin.

NOTE.—Water is considered bad for boilers due to the alkali. Oil 18,250 B. T. U. per lb. and percentage of moisture great, due to the fact that it had been standing uncovered in open barrels through several rain storms and was very frothy because of the impossibility of separating the water in handling the oil on the scales. Four scales were used, on which tanks were placed, two for the oil and two for the water. Filling and suction pipes were provided, with convenient cocks for switching from one tank to the other, making the reading of fuel and water continuous. Draft was fair, due to a 50-foot stack, but was so little that it could not be noted on a draft gauge. No blower was used.

—*Shipping Illustrated*, 10/2.

HIGH SPEED REQUIRED FOR CRUISERS.—The task of furnishing power for the fastest war or merchant ships afloat was placed on the shoulders of Engineer-in-Chief Robert S. Griffin, U. S. Navy, and his assistants in the Bureau of Steam Engineering of the navy when Secretary Daniels announced that the battle cruisers to be recommended for the next navy bill would have a speed of 35 knots. The most reliable advices do not indicate that the *Tiger* and the *Lion*, the fast battle cruisers of the British

Navy, have ever made much over 31 or 32 knots. The British battle cruiser *Queen Mary* has made 33 knots. The great merchantmen, which are the pride of the Trans-atlantic lines, make between 26 and 27 knots. The success of the Bureau of Steam Engineering in complying with this high-speed specification will be a notable achievement in naval engineering and will attract the attention of steam engineers throughout the world. Preliminary work on the plans for the new type of ship for the navy have progressed far enough to indicate that the new ships may reach the length of 800 feet and may have a beam of 105 feet. The necessity for this increase in size is due to the need of room for boilers to develop a high rate of speed. The engines in the new battle cruisers will probably have horse-power ranging from 150,000 to 200,000, as compared with from 32,000 to 35,000 horse-power for the latest type of United States battleships. After a ship passes a speed of 25 knots there is a rapid increase in the horse-power that is required for its engines. In a chart describing the horse-power that is required for ships at different rates of speed the line takes almost a perpendicular course after it passes the 25 knot mark. It is generally agreed that the battle cruisers should be oil burners and have turbine engines. Three systems of power, the straight turbine, the reduction gear, and the electric drive are under consideration and any one of them may be adopted. In the construction of the hull and in the armament the main consideration will be speed, and the new battle cruiser will be the greyhound of the navy.—*Army and Navy Journal*, 16/10.

THE GAS TURBINE.—For large powers, the turbine possesses many advantages over the reciprocating engine, such as small floor space and even turning moment, the latter feature being essential in the driving of electrical machinery, but up to the present time turbines have always been steam-driven. It is generally recognized, however, that the internal-combustion engine is more economical in its fuel consumption than the steam engine, owing to the fact that the energy realized by combustion is directly utilized in the cylinder of the engine. A considerable amount of discussion as to the possibility of running a turbine by gas has therefore taken place from time to time. Among many considerations there has been one which appeared fatal to the idea, *i. e.*, that the temperature of the resultant gases formed by the combustion of the fuel would be destructive to the blades of the turbine. Yet the *Electrician* informs us that the experimental gas turbine is an accomplished fact. Just before the war, a machine of 1000 horse-power was built in Germany. It is understood, however, that some difficulty was experienced in the operation of the valves, and it was not found practicable to work the whole of the explosion chambers. The turbine is worked on the impulse principle. In the ordinary internal-combustion engine the cylinder is an explosion chamber and power cylinder combined. In the impulse gas turbine the explosion chamber is separate from the power member. There are 10 pear-shaped explosion chambers grouped radially round the shaft of the turbine. In each chamber there are entry valves for air and gas. The operation is similar to the existing two-cycle gas engine, and is as follows: Air is forced into each explosion chamber in turn. The gas entry valves are then opened and gas is forced in also under pressure. When liquid fuel is employed a spraying apparatus worked by compressed air on similar lines to the Diesel engine is used. When the explosion chambers are filled with the correct proportion of gas and air, the mixture is fired by electric sparks passing between the contacts placed in several parts of the chamber. On the combustion of the charge the temperature rises, the pressure following. The outlet valve in the neck of the explosion chamber is then opened and the hot gases are forced out through a conical nozzle similar to that used in De Laval and Curtis turbines. From the nozzle the cooled and expanded gases impinge on the rotor. A fan is employed at the exhaust to assist in drawing the hot gases through the rotor. When the pressure in the explosion chamber has been spent, a blast of air is forced through to per-

form the office of scavenging, as in the two-cycle reciprocating engine after the completion of the power stroke. In the case of the turbine, however, the time available for scavenging is longer, and the result must be more satisfactory. A fresh supply of fuel is forced into the explosion chamber and the process continues. The exhaust gases are employed to raise steam in a small boiler, the steam being used to drive the fan, air and gas pumps, and also for the producer. It is claimed that a gas turbine would occupy only one-third of the space required for a gas engine of equal power, and would be one-quarter of the weight.—*Marine Engineering*, November.

SUBMARINES

REPORT ON LOSS OF SUBMARINE "F 4."—The complete report of the naval board of inquiry appointed to investigate the disaster to the submarine *F 4* at Honolulu on March 25, 1915, was made public by the Navy Department on October 27. The board was headed by Rear Admiral C. J. Boush; Naval Constructor Julius A. Furer and Lieutenant Kirby B. Crittenden, members; Lieutenant (J. G.) Harry R. Bogusch, recorded. Constructor Furer had charge of the salvage of the *F 4*.

The board made an exhaustive examination of the wreck of the *F 4*, and is a unit in the opinion that the corrosion of rivets in a ballast tank permitted sea water from the tank to penetrate to the exterior of the submarine's storage batteries and thence to the interior of the tank. As the sea valves of the tank were open as usual, additional water entered the hull, probably to the extent of several tons. This caused the submarine to sink, the board believes, while the generation of chlorine gas resulted from the action of the salt water upon the sulphuric acid of the batteries.

Within a very brief time, probably from two to four minutes, it is believed, the submarine had sunk to the bottom, 288 feet, where the water pressure was so enormous as to open her seams, flood the vessel and drown all on board. That drowning, rather than asphyxiation by chlorine gas, was the cause of death is the opinion of the board. Their report says: "Valves and rudders found operated; switches found thrown; engine room door intentionally closed; and that, therefore, the personnel were not asphyxiated before the vessel, under normal conditions, could have been brought to the surface."

The board also hold that defective diving qualities in this particular vessel, due to experimental propellers which had recently been added, prevented the guiding rudders from overcoming the downward tendency produced by the initial inflow of water. The report says: "No evidence found that the U. S. S. *F 4* had poor diving qualities prior to her docking in February, 1915, when experimental propellers were fitted, the only known alteration made; and that, therefore—

"The experimental propellers so substituted probably so affected the influence of the after diving rudders as to make it difficult for the diving rudder man to control the vessel; and that, furthermore—

"The poor diving qualities consequent upon this change of propellers were the secondary cause of the disaster."

It was found that the majority of the personnel took refuge in the engine room aft, while the disaster occurred forward. Many evidences were discovered of the efforts made by the crew to bring their vessel to the surface. It is believed that not more than five minutes altogether, and probably less, elapsed between the moment of the first sign of trouble and the culmination of the disaster.

Though the board finds that corrosion was the primary cause of the disaster, it is stated that no blame attaches in the least to any of the personnel of the *F 4*. The corrosion was in a place where its existence would hardly be expected or discovered even in the most thorough overhauling of the vessel.

How the "F 4" Sank.—The *F 4*, the report of the board states, had but recently come out of drydock after a thorough overhauling, in the course of which her stability was tested and found normal. Also a set of experimental propellers was fitted to her and it was found by her commanding officer that their effect was to make the vessel less responsive to her rudders. On the day of the disaster the *F 4* submerged for a short underwater run across Honolulu harbor. The department requires that no submarine dive to a depth of more than 100 feet, and it is assumed that the *F 4* resumed even keel after reaching a depth of from 60 to 80 feet, as is customary.

Suddenly it was noted that the vessel was sinking to a lower level, as shown by the indicators. The first move of the commander was to adjust his rudder for an ascent. The vessel, however, owing to the weight of the water entering the ballast tank and into the battery tank through the leak by the corroded rivet and also because of the lessened responsiveness as a result of her experimental propellers, failed to rise to the rudder. It continued to descend.

The mechanism for expelling all water from all ballast tanks was thereupon started without affecting the situation, the vessel continuing to sink. Probably simultaneously the commander endeavored to turn around to head his vessel inshore so as not to get further off the rapidly shelving bank of Honolulu harbor. This maneuvering with his propellers in the effort to turn reduced his headway, which would have the effect of causing the vessel to sink more rapidly.

The *F 4* was found at a depth of 288 feet. She was built to stand the pressure of the sea at depths not more than 200 feet. Consequently her seams began to open and under the tremendous pressure large volumes of water poured into her in a very brief time. The crew rushed for her engine room, closed the door and apparently made some attempt from there to rescue the vessel. The engine-room bulkhead gave way, however, and the entire vessel was flooded.

This account of the efforts made to save the *F 4* as given in the board's report is all based on the condition and position of various pieces of apparatus, valves, etc., which could not have been effected, it is believed, by the salvage operations.

Findings of the Board.—Following is the text, in part, of the conclusions of the board:

"The accident which caused the loss of the U. S. S. *F* 4 on the morning of March 25, 1915, occurred before the vessel reached the predetermined depth for which the automatic blow had been set—which depth, the board assumes, was less than 100 feet, as required by the department's order. Some member of personnel opened blow valves on 100-pound manifold to forward main ballast and auxiliary ballast tanks, and tripped automatic blow—which blow was found connected with forward main, middle main, and after main ballast tanks; and that, therefore,

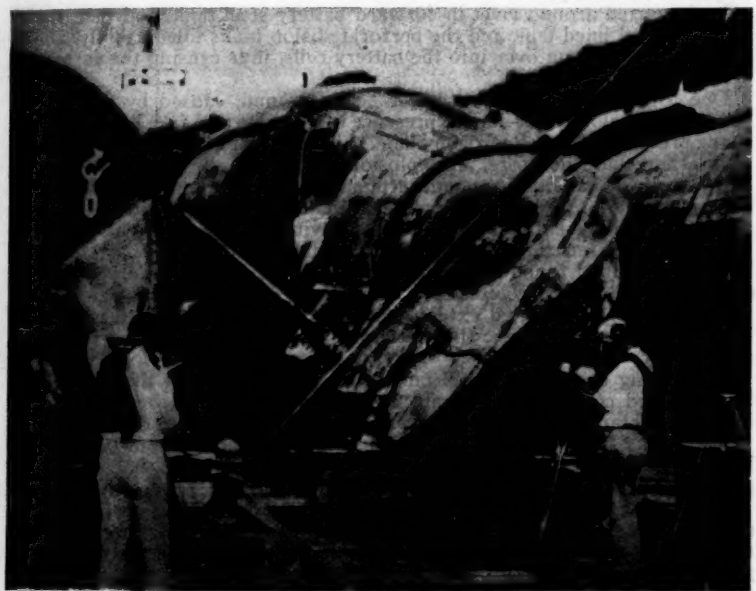
The most effective procedure for bringing the vessel to the surface was carried out. Diving rudder indicators read seven degrees rise on bow rudders and 15½ degrees rise on after diving rudders; and that, therefore, these indications signify that the diving rudders were used to assist in bringing the vessel to the surface. Diving rudders are operated through worm and sector, and that, therefore, the positions of the rudder indicators are not the result of external working of the rudders, but are, in fact, the angles to which the rudders were last moved by the personnel.

Overboard discharge and stop valves on fuel oil lines found closed, and that, therefore, no attempt was made to blow fuel oil overboard. As vessel filled with water, deck over fuel tanks crushed, forcing oil into vessel, and that, therefore, this oil found its way through open seams in the shell plating and through the forward ventilator to the surface.

Valves on 100-pound emergency air lines to forward compartment and engine room found closed, and that, therefore, no attempt was made to blow water from these compartments.

Engine-room door found dished in same manner as engine-room bulkhead, and that, therefore, this door must have been in the closed position when the engine-room bulkhead failed. Under normal conditions engine-room door is kept open, and that, therefore, this door must have been closed by intention when many of the personnel sought refuge in the engine room.

Fifteen bodies found in the engine room, and that, therefore, it is probable that some members of the personnel sought refuge in the engine room before its door was closed. Three bodies found forward of engine-



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WRECK OF SUBMARINE "F 4" TAKEN IMMEDIATELY AFTER BEING RAISED

room bulkhead, and that, therefore, it is probable that not all of the members of the personnel attempted, or were able, to reach the engine room.

Automatic blow found tripped; valves on 100-pound air manifold found open; switches found thrown; diving rudders found operated; and that, therefore, some member or members of the personnel were alive and capable of action for at least a short time after the occurrence which led to the disaster. Engine-room bulkhead failed an appreciable length of time after occurrence which led to disaster, and that, therefore, this time interval was probably sufficient for the vessel to reach the bottom.

The accident which was the primary cause of the disaster occurred forward of the engine-room bulkhead. Slop tanks and lead lining of battery steel tanks found corroded, and that, therefore, this corrosion resulted from the chemical action of sulphuric acid upon impurities in the lead. Sulphuric acid found its way through perforated lead lined tanks, and that, therefore, the corroded condition of the rivets and plating of the battery steel tanks resulted from the chemical action of sulphuric acid. Battery steel tanks in

general found in excellent condition, and that, therefore, the corrosion of certain rivets and areas occurred prior to March 25, 1915, the date of the disaster.

Valves and rudders found operated, switches found thrown, engine-room door intentionally closed, and that, therefore, the personnel were not asphyxiated before the vessel, under normal conditions, could have been brought to the surface.

Corroded rivet in port wall of forward battery steel tank, in wake of Frame No. 51, found to leak slightly under even a small head of water—not more than one foot—to which this portion of tank could be subjected in dock, and that, therefore, on the dive of March 25, 1915, this corroded rivet leaked considerably.

Leak started around rivet in forward battery steel tank, and that, therefore, the lead lined tank and the perforated slop tanks filled rapidly, allowing salt water to run over into the battery cells, thus causing the formation of chlorine gas.

Due to inevitable short circuit or heavy ground, caused by flooding of cells through slop tanks—in the presence of chlorine and free hydrogen (or, in the presence of free hydrogen alone, if in sufficient quantity)—electric arc struck, and that, therefore, an explosion occurred.

Rubber jars, hanging bars, and terminal connections found not shattered, or damaged to any considerable extent; ventilator flaps found in excellent condition, and presenting no evidence of having been violently blown open; small cord line, securing forward ventilator flap to upper starboard torpedo-tube door handle, found intact; and that, therefore, if a battery explosion occurred, it was not very violent.

A battery fire of limited extent occurred in the forward battery positive cell, but that, nevertheless, this battery fire was not the primary cause of the disaster.

Lead lining of forward steel tanks found corroded, and that, therefore, the corroded condition of certain rivets in the port wall of the forward battery steel tank was probably the primary cause of the disaster.

Slop tanks found corroded; suction pipe leading to bottom of forward battery lead lined tank found plugged with marine glue, and that, therefore, these conditions were contributory to the disaster.

No evidence found that the U. S. S. *F 4* had poor diving qualities prior to her docking in February, 1915, when experimental propellers were fitted—the only known alteration made; and that, therefore, the experimental propellers so substituted probably so affected the influence of the after diving rudders as to make it difficult for the diving rudder man to control the vessel; and that, furthermore, the poor diving qualities consequent upon this change of propellers were the secondary cause of the disaster.

From facts established, that the accident resulting in the disaster of the U. S. S. *F 4* on March 25, 1915, was not due to carelessness, negligence or inefficiency on the part of the officers or men of the vessel; and that, furthermore, the personnel remained at their respective stations until all effective means employed to avert the disaster impending had failed, and thereafter sought refuge."

Corrosion Primary Cause of Disaster.—The board then stated its conception of the whole disaster of March 25, 1915, as follows:

"The primary cause of the disaster was the corroded condition of the lead lining and, in consequence, of certain rivets in the port wall of the forward battery steel tank; and

The secondary causes of the disaster were: (a) The poor diving qualities of the vessel; and (b) the consequent failure of the vessel promptly to respond to measures taken to bring her to the surface.

Unknown to the commanding officer the vessel acquired some negative buoyancy forward of the center of gravity, through the leaky rivet in the port wall of the forward battery steel tank. Water accumulated in the

forward battery lead lined tank and through corroded slop tanks overflowed into the battery cells—in contact with the sulphuric acid in the cells generating chlorine gas.

The vessel developed a strong tendency to dive. Upon these intimations of danger there followed: Up-rudder, but, due to the poor diving qualities of the vessel, aggravated by the additional quantity of water taken in through the port wall of the forward battery tank—vessel did not respond, but, in fact, continued to descend, and—downward momentum gained before propellers were stopped. In the endeavor to check the downward momentum maneuvering with propellers probably took place.

The appreciable length of time requisite for air to build up in ballast tanks for the expulsion of sufficient quantities of water resulted in vessel reaching crushing depths.

Seams of the vessel began to open, and—probably through open torpedo-tubes and seams—water entered the vessel, and a condition of positive buoyancy was never attained. There followed actual disaster. Vessel began filling with water.

Personnel abandoned stations, and many sought refuge in the engine room, closing its door. Under great pressure engine-room bulkhead failed suddenly, leaving vessel on bottom, completely flooded."

Statement by "F 4's" Builders.—The Electric Boat Company gave out a statement in regard to the naval board's report on the *F 4*, saying, in part:

"The item of lead lining and corrosion of rivets would indicate lack of care. All vessels and machinery are liable to corrode, and should be regularly overhauled, cleaned, and painted. Measures are now being taken carefully to guard against deterioration of this nature of boats now in the service. While this corrosion may possibly have been a contributory cause to the accident, it could not have been the main cause, as it is always possible to detect such leaks and bring the boat to the surface before serious damage results.

The propellers on the *F 4* were an improved design on those used on previous boats. These propellers differed only slightly, having increased area of blades. They were used on this boat during her official acceptance trial, and no evidence of poor diving qualities was discovered then, nor was any mention of poor diving qualities ever made in official reports after commissioning. It is impossible to see from a technical point of view how such slight variation in propellers could affect the diving qualities of the boat in any way.

The question of air valves having been found open on the forward, middle, and aft main ballast tanks and the auxiliary ballast tank will account for the loss of the vessel. When a submarine is properly handled these valves are only open sufficiently long for the air to escape from the ballast tank when the tanks are being filled. Immediately after filling the tanks the valves must be closed; if they are not closed, it is impossible to blow the ballast from the tanks and allow the boat to rise to the surface. In case a boat is carelessly trimmed and in case she should spring a leak, or have a collision with a reef or any submerged object, she is doomed unless these valves are closed.

An automatic device known as the automatic blow is fitted for the purpose of automatically admitting air to the ballast tanks when the boat through negligence or accident exceeds a predetermined depth. If, however, the vent valves are left open the automatic valve, although it may work properly, can accomplish nothing.

This one fact is sufficient evidence of the cause of the loss of the vessel. Such primary causes as negative buoyancy, a leak, or a collision, would not necessarily result fatally unless these valves had been left open. All instructions governing the operation of boats require these valves to be closed. Nothing further is required to explain the much regretted loss of this vessel.

In the foregoing remarks there is no intention of reflecting on the unfortunate men who lost their lives in the vessel, but the fact that these valves were left open must not be overlooked.—*Army and Navy Journal*, 30/9.

SUBMARINE STORAGE BATTERY MAINTENANCE.—In the cycles of charge and discharge of the storage batteries of submarines, it is essential that just the right number of ampere-hours be returned to the battery after a submerged run. The tendency of a conscientious operator is to overcharge the battery, thus boiling active material out of the plates and shortening the life of the battery. At present the operator gauges his amount of charge by the voltage across the battery and by the specific gravity of the electrolyte. Because of the variation of the voltage *vs.* charge curve with temperature, the voltage is not always a safe guide as to the state of charge of the battery. The specific gravity is a better guide, but in the course of repeated additions of distilled water or electrolyte, the specific gravity may mislead. Then, too, the operator is apt to charge until he is sure that the specific gravity is constant, in other words, to overcharge.

In the case of electric lighting of steam railroad trains from axle generators, storage batteries are needed to take care of the stops. Here we have a case of storage battery use closely parallel to that of the submarine. The stops in the case of train operation correspond to submerged running when the battery in both cases is discharging. The train running between stations and charging the battery from the axle generator corresponds to the submarine cruising on the surface and charging the battery. In the case of train lighting storage batteries were found to give rise to excessive maintenance cost, due usually to overcharge. This trouble has now been obviated by using a watt-hour meter to keep a record of the state of charge of the battery. The watt-hour meters are of the mercury float type. For submarine work the revolving disc of the meter through a worm and gears would be arranged to turn a needle, centered in front of a large circular dial. After a submerged run the watt-hour meter would read a certain number of kilowatt-hours of discharge. The operator has only to charge until his needle is brought back to zero and then to a point with lead batteries 25 per cent more on the charge side or 30 per cent with the Edison batteries. Reference: Train Lighting by R. C. Lanphier.—*Proceedings of the American Institute of Electrical Engineers*, August, 1915.

EDISON BATTERIES TESTED.—The first official test of the Edison storage batteries for use in submarines took place on November 11, when the *E 2*, equipped with the new cells, made a long trip up Long Island Sound. Details are not yet made public, but the trial was apparently a success. Many navy officials and electrical experts watched the *E 2*, which has been in service since early in 1912, as the submarine swept past Execution Light on her trip. Late in the afternoon the *E 2* returned to the New York Navy Yard. The boat was under water part of the time. It is said that in an unofficial trial of the new batteries a week ago the *E 2* made 13 knots an hour for three and a half hours while submerged.—*Army and Navy Journal*, 13/11.

ADMIRAL GRANT RECOMMENDS BIGGER COAST DEFENCE SUBMARINES.—An increase in the size of the coast defence submarines, it is said, has been recommended by Rear Admiral Albert W. Grant, U. S. Navy, commander of the submarine flotilla. It is stated that the admiral is urging the Secretary of the Navy to ask for the authorization of 800-ton submarines instead of 500-ton boats, which is the standard size of the coast defence submarines in the navy. This is the size of the most effective boats in the German Navy, according to reports received at the department. The chief advantage in the larger type of submarines is in their increased radius of action under water, the 800-ton boats being able to go to sea and lie

near the bottom for days watching for the enemy. One of the larger type, it is stated, would be able to cover twice as much seacoast in a more effective manner, and on this account will be cheaper than the smaller type, not taking into consideration increased speed under the sea and more effective armament. The fleet submarine is still regarded by many of the navy officers as in the experimental stage. They are not yet convinced that a submarine can be operated successfully with the fleet, and there is a question as to whether the submarine's sphere is not confined entirely to coast defence work. At their present state of development it is important to operate a submarine from a land base. The German system of operating submarines, according to reliable reports, consists of a schedule of 24 days at sea and 12 days at base. It has been found necessary to spend about 12 days out of 36 in going over a submarine at a shore station to keep it in condition for effective service. In this time the submarine is tuned up and inspected so as to be in perfect condition when it is sent to sea. During the 12 days at the base the crew of the submarine is granted leave, which gives the officers and men an opportunity to keep in the best condition for the extraordinary efforts that are required to handle the undersea craft.—*Army and Navy Journal*, 6/11.

NEFF SYSTEM OF SUBMARINE PROPULSION.—The Neff system of propulsion for submarines will be tested in the U. S. S. *G 2* if the necessary legislation for the remodeling of the submarine is passed by Congress. In order to install the system it will be necessary to remove the old machinery to make room for the new power system. The expense of doing this will be in excess of the amount of repairs that the Navy Department is authorized to make on the submarine without authority from Congress. Aside from increasing the undersea speed of submarines to approximately that of their surface speed, it is claimed that the system will solve the gas and pure air problem of the submarine. By dispensing with the necessity for electric power and giving the submarine full engine power under sea the increase in speed is secured. The space occupied by the storage batteries in the present submarine construction will be filled with storage tanks for compressed air. The air is released from the flasks in the forward part of the ship and passes back to the engine. After the air is used for breathing purposes it passes to the engine, where it is used for combustion. The air passes out under the propelling wheels of the boat in such a manner, it is claimed, as to avoid any bubbles on the surface over the boat. Until the boat is completely submerged it will continue to take in fresh air, and when it approaches the surface the air pipes automatically open and fresh air begins to flow into the boat. The chief improvement is claimed for the patents for handling the air supply.—*Shipping Illustrated*, 30/10.

STEAM TURBINES FOR SUBMARINES.—Steam turbines may be substituted for gasoline or oil engines for surface cruising in future submarines. Plans are under consideration at the Navy Department for steam experiments with boats of the *G* class, now under construction. As yet no definite decision has been reached, but the faults of internal combustion engines for submarine work have been so difficult to overcome that navy designers are seriously seeking a substitute. A steam propelled submarine was built for the navy more than a decade ago, but proved so hot when the fires were lighted that she was not accepted. Many French submarines employ steam engines successfully, and it is understood that a scheme, details of which have not been made public, has been evolved by American engineers which promises even better results.—*Marine Journal*, 23/10.

TESTS OF NEW SUBMARINES.—The new submarine *M-1*, under command of Lieutenant M. R. Pierce, was given a most severe unofficial test in Cape Cod Bay, Mass., September 28, during half a gale, and fully realized the expectations of her constructors, the Fore River Shipbuilding Company and the

Electric Boat Company. Her diving, it is said, was perfect, and she was handled with the greatest ease. In her underwater run, although she was handled very carefully and not pushed, she made 10 knots. According to Mr. Ewartz she will be able to remain submerged 72 hours and probably longer in an emergency, and can with safety descend to a depth of 150 feet. Her official trials will be held in November. On board the *M-1* besides Lieutenant Pierce was Gregory C. Davison, vice-president of the Electric Boat Company. Captain P. Glenn was in command during the trial. The builders will guarantee the government that the submarine has a cruising radius of 3500 miles, but the superintendent of the Fore River Shipbuilding Company, Mr. E. A. Ewartz, under whose direction she was built, declares she can easily cover 6000 miles without replenishing fuel or supplies. She must have a surface speed of 14 knots and an underwater speed of 11 knots, according to the specifications, and her builders are confident that she will make these speeds and better. She is equipped with two Diesel engines, with a combined horse-power of 900, and two motors of 170 horse-power each. She cost $620,000.

The *H-11*, one of the 10 submarines built for the British Navy by the Fore River Shipbuilding Corporation and the Electric Boat Company, was tried on September 29 for three hours under the waters of Cape Cod Bay with 25 persons on board. She made a dive, ran submerged for an hour at a speed of from 8 to 11 knots and fired four torpedoes at an imaginary enemy. The submarine during the tests rested for several minutes on the bottom of the bay at a depth of 42 feet, and for almost half an hour, without a piece of her machinery moving, lay perfectly still 35 feet below the surface. A correspondent of the *New York Herald*, in writing of the test, said: "The four torpedoes were fired when the *H-11* was making 11-knot speed. Inside of two minutes the four of them had left their tubes, and there was just the suggestion of a jar as they shot into the sea. Inside of five minutes more the tubes had been reloaded and the ship was again ready for the deadly business for which she is designed. The automatic safety device received a very thorough test. This device is to enable a submarine, if anything goes wrong with the motors, to rise immediately to the surface of her own accord. The 'automatic' was set to stop the descent of the *H-11*. When she reached 30 feet she paused there and then bounded toward the surface. In 30 seconds her deck was exposed. After the *H-11's* trials were over for the day the *M-1*, Uncle Sam's biggest submarine, was taken out on the course and run at various speeds submerged for about four hours. Twice for short distances she made 11 knots, which is half a knot faster than her contract speed, and it is the belief of her builders that she can be driven 12 knots." In another trial on September 30 the boat, it is reported, was submerged to a depth of 200 feet and remained on the bottom 14 minutes. The submarine was almost an hour under water, most of the time below a depth of 30 feet, and those who were on board say she behaved splendidly. Among those on board were Lieutenant Percy T. Wright, U. S. Navy, an English naval officer and officers of the Electric Boat Company.—*Army and Navy Journal*, 10/2.

SUPERIORITY OF "M 1" QUESTIONED.—The American claim that the new U. S. submarine *M 1* is in advance of European construction is not entertained here, where the British *F's* and the French *Zédés* are held to have no rivals either in Germany or anywhere else. In contrast with the policy of the English Navy which has increased the size and speed with every successive series, the French Admiralty is yet experimenting with four different types of submersibles, all of remarkable design and possessed of a higher degree of buoyancy than all English boats up to the *F* series, but differing considerably in size, speed, and radius of action. Commanders have been officially appointed for several of these, ordered in 1912, and the vessels will prove a highly efficient addition to our flotillas, as shown in recent trials, and no mean asset on the side of the Allies.

The war will have proved a test of destroyers, no other class of vessels having been so constantly on duty at sea. Unique experience will, of course, have been gained by the British Navy with her very numerous torpedo craft, which comprise the most up-to-date designs, and rank in displacement from some 200 to over 1200 tons. Though less favored in this respect, the French Navy has already acquired valuable data from the comparative behavior and endurance of the 300 torpilleurs and contre-torpilleurs which are maintaining an untiring and effective watch both in Northern waters and in the Mediterranean, and it is known that notable changes are contemplated in the destroyer policy of the Rue Royale. In the 1000-ton boats of the *Intrepide* series (completing for the Argentine Republic at the outset of the conflict and then requisitioned by the Paris Government) our officers are experimenting with units distinctly in advance of our 750-ton *Bissons*, and similar in armament and sea qualities to the English *M* class. The test has proved favorable, and "croiseurs légers" is the term applied to these new recruits, which have in their four 4-inch guns effective means of bombardment at moderate range, and means also of adequately replying to Austrian and German light cruisers. But when everything is said as to the capital value of size and great engine power, there is a quality on which all naval men with war experience insist more than ever, though it is not reckoned in paper statistics, and that is simplicity, uniformity, and robustness in the motor system, as well as in the artillery installation. Despite some improvement the Republican Navy is yet a long way behind the English in this respect. In Gallic ships belonging to the same class and outwardly similar, especially in destroyers, there are in internal arrangements differences which testify to the ingenuity and originality of our constructors, but unnecessarily complicate the work of the crews as well as the repairing problem. Thus the three destroyers now undergoing trials or completing *(Lestin, Roux, Gabolde)* differ in size and motor system. It is especially since the war that Frenchmen envy the British practice of building completely homogeneous series of war vessels. Happily there is ground to hope the lessons of the "real thing" will not be lost upon the service.—*Naval and Military Record*, 13/10.

PROF. PARKER'S BABY SUBMARINE STILLBORN.—The baby submarine of Professor Parker, that is already revolutionizing warfare in the minds of our American friends, is in competent quarters here considered as something of a stillborn infant. This phenomenon does not appear, indeed, to have a very auspicious career in front of it if French experience is anything to go by. The idea of David slaying the giant, of diminutive craft of trifling cost sinking mastodons million pounds worth, has always been cherished by would-be French inventors who, in the remarkable devices from time to time offered to the Rue Royale Admiralty, only forgot one thing, but of capital importance, viz., the true conditions of sea warfare and the fact that *la mer est cruelle aux petits* (the sea is cruel for the undersized), and that, consequently, a common tendency to craft of all classes is to continuously increase in displacement, with a view to being in a better condition "to fight the sea," which is the first enemy, and an everyday one, of navigators. It was, it will be remembered, the ambition of the late Minister Pelletan to endow his country with a swarm of mosquito submarines, intended to be carried on board large ships to their scene of action and there to be put to sea and immediately proceed with their work of destruction of hostile battleships. With that end in view, the talented Constructor Maugas designed small submarines of about 40 tons (at first 20 tons was intended) that were ordered 12 years since, and known as the *Guêpe* class. But subsequent experiments caused their construction to be promptly abandoned. It was discovered (1) that the putting to sea of diminutive submarines in presence of the enemy would be a very problematic affair even in fine weather and out of question in choppy waters; (2) that the *Guêpes* would be too small to offer anything like tolerable conditions of

habitability and too fragile for serious business. The 20 *Naiades* of 67 tons, built on the plans of the late Mons. Romazzotti, though relatively robust, have fully confirmed this opinion. Of doubtful war value, they have cost tremendously in upkeep and repairs, and have had to be discarded after six or seven years service, whilst many of their larger contemporaries are yet doing useful duty round our coasts. To preserve undiminished the health and fighting powers of the crew, to carry strong weapons easy to handle and certain to be available when wanted, to have motors and a hull robust enough to force a way through the sea on to the intended prey—all that requires a minimum displacement which French experience fixes at just under 400 tons. Underwater craft of a few tons, like the *Goubet*, can be very interesting from an experimental standpoint. They will, it is safe to say, never affect the balance of naval power.—*Naval and Military Record*, 20/10.

FREIGHT SUBMARINES.—Mr. Simon Lake made some interesting remarks to an interviewer recently on the subject of what he called freight submarines. He considers that a submarine to carry cargo, able to travel from Europe to America and back without refuelling, is not only a practicable proposition but a necessary one "if this war lasts much longer." As to the practical nature of the proposal, we are not so much concerned here, for Mr. Lake, as an inventor of submarine craft with considerable experience, is the better authority. But the necessity of his freight submarines is another matter. He evidently exaggerates either the effect of the destruction of merchant shipping by German submarines, or else the growing power of the latter. "When her enemies wipe out England's merchant vessel travel," he says, "all her supplies will have to be obtained by the underwater route." But this time is not yet, nor will be for years to come. Mr. Lake evidently does not realize that the whole trend of submarine warfare is for the underwater vessels to become more and more surface boats, with the power of submersion as a means of defence or of stealthy approach to their prey. When the element or quality of submergence has been given to much larger ships than at present, it will be time enough to consider whether merchantmen should possess it. Even then, however, it will probably not be thought worth while. The menace of the submarine to cargo-carrying vessels is infinitesimal at present; by the time freight submarines are in existence a simpler and less expensive way will surely have been found to meet it. Like everything else introduced into naval warfare, the submarine as we now know it will have its antidote in due course, even if—as shown by the recent revelations of French and American writers—this has not already been found.—*Army and Navy Gazette*, 16/10.

"L" CLASS OF SUBMARINES HAVE ENGINE TROUBLE.—The new U. S. submarines of the *L* class are understood to have given much trouble during recent trials, owing to defects which developed in the operation of their Diesel engines for surface cruising. The boats in question are the first of the *L* class, which have been built at Quincy, Mass., on account of the Electric Boat Co. It is rumored that on account of the difficulties experienced with the Diesels of submarine boats it would not be strange to see the Navy Department going back to steam for surface propulsion of submarine boats.—*Shipping Illustrated*, 2/10.

MODEL EXPERIMENTS FOR STABILITY OF MOTION OF SUBMARINE BOATS.—The article deals with model experiments for determining the factors for stability of motion of submarine boats. It is shown that a certain force of reaction, varying with the longitudinal inclinations, will manifest itself ultimately by a depressing force and a tipping moment. To establish stability of motion this latter moment has to be controlled and counteracted by the after horizontal rudders. A description is given of the apparatus

at the tank, which, by sliding rods and indicators, gave the resulting reactions for inclinations up to 4 degrees forward. The gradually advancing position of the reaction force is shown to indicate the relatively desirable amount of trim ballast and the point of coincidence of C. G. and reaction—in the investigated case at 1½ degrees forward inclination—which requires no action of after rudders for stability of motion. It is concluded that by such model experiments it would be possible to closely predetermine the most desirable form of hull and appendages. 11 illustrations. 2550 words.—*Schiffbau*, February, 10; *International Marine Engineering*, October.

THE LOOKOUT FOR SUBMARINES.—It is widely recognized that, with an efficient lookout to detect the existence of a submarine in the neighborhood of a ship, effective measures can be taken against a successful attack by the torpedoes of such craft, either by immediate and rapid retreat from the vicinity, or, if there is reasonable prospect of success, by combating the submarine boat. It is true that the periscope offers a small point of observation, but this only increases the importance of a complete and sharp lookout. The difficulty is that, with the best of binoculars or telescopes, the movement of the ship disturbs the constancy of the observation. Even with the arms resting on the rail of the bridge, or of the gunwale, the movement of the ship is a disturbing element. Mr. John Gardner, of Fleetwood, the well-known inventor of the Gardner submarine signalling system, has devised a method which promises to overcome this difficulty, as he ensures that the observer, comfortably seated, with his telescope supported on a stand in front, can be certain that the telescope or binocular glasses will always be approximately parallel to the surface of the sea, irrespective of the movement of the ship. He achieves this end by mounting a pedestal securely to the deck, and on this is carried the seat, with the table to support the telescope or binoculars on a standard, and the seat and table are maintained truly horizontal relative to the sea surface by the operation of a gyroscope. Moreover, the platform, with seat and table, is automatically rotated slowly from left to right, and *vice versa*, by the utilization of the power for the gyroscope, so that the observer need only concern himself with keeping a sharp lookout within the field covered by the slowly-moving instrument. It will thus be seen that, irrespective of the movement of the ship, due to seaswell or waves, the lookout can scrutinize every part of the sea-surface within a radius compassed by the telescope in its movement to and fro.—*Engineering*, 13/11.

DEFENCE AGAINST SUBMARINES.—Despite differences of opinion within the service on the value of the wire net defence against torpedo attack, provisions for the fittings and supply of such nets are, it is reported, included in the new estimates. This change in views heretofore held by the Navy Department is said to be attributable to the results of experiments with approved appliances and to favorable reports from abroad. What the new nets may be is not known publicly, but so far as actual experience goes the old system, in addition to its manifest disadvantages when under way proved no safeguard to the ships destroyed in the Ægean.

In the designs of constructions already authorized and possibly for those to be provided by the next program no great technical problems have to be solved, except in this matter of protection from submarine and torpedo attack generally. The Allies appear of late to have been successful in minimizing this assault by external defence, largely dependent on the efficient outlook of destroyers and patrol craft and to an unknown degree on novel underwater appliances. Whether these can be supplemented by some plan of interior subdivision, combined with additional armor, remains a matter of speculation that is not altogether fortified by the latest firing on the hulls of experimental targets.—*N. Y. Herald*, 9/11.

SUBMARINES DISAPPOINTING.—The gentlemen of *la jeune école*, though highly pleased with the prominent rôle submarines are assuming in warfare, cannot be said to be altogether satisfied with the course of events. They had expected better; and especially it was formerly an axiom with them that a few hostile underwater craft could render impracticable narrow seas like the Channel, and they would have laughed at the very mention that La Manche could be kept, in war time, a safe Anglo-French lake. On many other points also they have been bitterly disappointed, and the practice has proved totally different to the theory. The boasted invisibility and consequent invulnerability of the submarine, and its power to deal deadly blows without risks, have vanished like so many other cherished illusions. The submarine rising to the surface, or simply showing her periscope, is never assured of not meeting instant death in the shape of shells from aerial machines and torpedo craft, as testified by the successful hunting young English and French officers are ceaselessly carrying out in Northern waters. And as to the submarine fleet forming an inexpensive naval defence, Germans, no doubt, could tell a very different tale, and, as a matter of fact, it has already been told by the striking contrast between the frightful menaces in which the Boches indulged in February last and the very small deeds performed by their decimated or crippled submersibles. The inherent fragility of underwater craft has reduced to very little the practical results of the tremendous Teutonic efforts.—*Naval and Military Record*, 8/9.

AMERICAN ADMIRAL ON BATTLESHIPS VERSUS SUBMARINES.—The future of the battleship and the submarine their relative strength and weaknesses, are exhaustively dealt with in an article by Rear Admiral F. Goodrich, an American naval authority, in the forthcoming issue of *The North American Review*.

Admiral Goodrich minimizes the importance of excessive speed in warships on the ground that it is not always worth the price. Modern warship armor, he says, cannot be penetrated at a range of more than seven miles, and therefore it would be well to thin the armor of battleships and put the weight thus saved into more battery power. The experience of the present war has shown that guns alone determine the issue in a modern naval battle. It is a mistake, he insists, to minimize the importance of the secondary batteries of 5-inch and 6-inch guns. Modern battleships are not entirely encased in shell-proof armor, and it is the secondary batteries that are apt to be most effective in a running fight.

Admiral Goodrich pays a tribute to the measures employed by the British Admiralty in dealing with the submarine menace. "I am not at liberty," he says, "to state the number of German submarines already captured or destroyed. It is so large that one must admire the courage of their officers and seamen."

Discussing the relative merits of the battleship and the submarine, Admiral Goodrich writes:

"In one sense it may be said that this war is between the battleship and the submarine. The latter has certainly come to stay. It has lately taken on the rôle of a gun-vessel, in addition to that of a torpedo-boat. I have long known confidentially that it has been extensively used as a scout. The submarine has brought new problems into naval tactics, which must gravely influence the handling of battleships. It acts however, under two disadvantages. Its invisibility is not entirely completed. It must at least lift its periscope above the water in order to recognize its target, and it is extremely vulnerable."—*Reuter, Naval and Military Record*, 15/9.

SUBMARINE LIMITATIONS.—The war is settling in no uncertain way what the limitations of the submarine are, when it is used in legitimate spheres of naval action. Those authorities who were so insistent at the outbreak of hostilities that the days of the battleship were numbered must have cause seriously to reconsider the conclusions to which they had come. There

has been no such widespread destruction of powerful warships as was prophesied, nor is it demonstrated, so far as the war has gone, that these large units are incapable of defence against insidious attacks of submarine foes. It is quite true that underwater craft offer a new menace to ordinary vessels, but to every such new danger the ingenuity and bravery of our naval forces always has and always will provide new defences. It was hoped and expected by our enemies that the result of their submarine attacks would be a great reduction by "attrition," that blessed shibboleth which indicated for them the method by which they were to reduce our naval forces to an equality with theirs. There has been attrition truly, and of a serious kind, but its operation appears on the wrong side of the account for Germany, and the reduction in the number of her submarines must give pause to her sanguine expectations. No one will be so stupid as to assert that these vessels have little military value; on the contrary, they have proved invaluable in certain spheres when commanded by brave and fearless men, but that is not the same as saying that because of them the days of the battleship are numbered.

The fact is that the issue is not so much between submarines and battleships as between submarines and destroyers, with the co-ordinated assistance of other small units. No secret is made of the success we have attained in grappling the problem. No one probably anticipated that the submarine would be used to attack undefended ships carrying passengers, far less that such vessels would be sunk at sight without warning; and we must be careful in seeking a just conclusion lest we confuse the illegitimate triumphs of the submarine with the actual military successes which it has accomplished. We do not know that the possibilities of the submarine have been fully exploited but we must form our judgment on the facts we have. There seems no reason to depart from the opinion expressed here before the war, that the menace to our powerful ships is not nearly so great as to invalidate their position as keepers of the sea. It would be a most serious position for us if the pessimists had proved to be correct in their prognostications, for at no time in our history has the country so valued the security afforded by its magnificent navy. No useful purpose can be served by harboring fears which events have not justified, nor is it wise to place too much dependence ourselves on an arm of the navy which has still to win its spurs in action against armed and alert foes. That the submarine has great possibilities both in its present stage of development and in its potentialities for further growth is certain, but its limitations are no less clear than its powers. Size, power and speed of these vessels on the surface are all capable of increase; they can be armed with more powerful guns; they may be constructed of sufficient breadth to allow of the discharge of broadside torpedoes, so as to avoid maneuvering to use bow or stern tubes, and the radius of action at cruising speeds is capable of expansion. But it is very questionable whether it will ever be possible to render underwater navigation safe for speeds much greater than those at present attainable, and so long as the vessels are vulnerable on the surface, and slow when submerged, the methods successfully used to compass their destruction will lose none of their present value. Very probably these methods are also capable of improvement, for if ingenuity in defence does not expand *pari passu* with growth of the enemy's power, then a new era will have set in for the British Navy, and we may look to our laurels indeed. Sinking of harmless vessels at sight may be put out of count, for if that species of warfare is to be tolerated, then we must logically expect to see destroyers, cruisers and battleships using their guns and torpedoes in the same dastardly way. There is really no essential difference of method, unless it be that submarine attack being the more insidious is therefore the more abominable. These outrages have, however, proved the impossibility of using submarines effectively to control ocean traffic by any means short of actual use of the torpedo. If a merchant vessel subject to attack be

provided with, say, a 4.7-inch naval gun, for defensive purposes only, and have a good turn of speed, she may snap her fingers at any demand to stop by a submarine. The underwater boat must come to the surface to fire a warning gun or otherwise to make her presence known, and she thus becomes liable to be sunk by gunfire from her quarry, and it is not likely that submarines will take this risk. There is, therefore, no other method short of sinking the vessel on sight by torpedo, and it is not easy to see what satisfactory arrangement can be made to meet both the desires of the Germans to control ocean traffic and the demands of the United States that the piratical methods shall cease. In the meatime, orders have been issued to commanders of the *U* boats that passenger vessels must not be torpedoed on sight, that due warning must be given and ample time allowed for crew and passengers to get clear, unless the liner attempts to fight or run away when hailed. Even in such a case, if there be any doubt as to hostile intentions, a torpedo must not be fired unless the submarine commander is absolutely convinced of such hostile intentions. This sounds very well, but one is driven to the conclusion that either there is no intention of carrying out the spirit of the order or that the enemy is making a virtue of a necessity because of inability to continue submarine warfare much longer on the old lines. It is inconceivable that British sailors should agree to join in such a pretty game of "Dilly, Dilly, come and be killed" as that, and nothing shows more clearly the limitation of the submarine than the impossibility of holding up a defensively armed vessel by any means short of launching a murderous torpedo at her. The value of submarines is measured by their power of evading measures taken to destroy them and successfully to deliver invidious attacks on more powerful units or on vessels used for transport of troops and munitions. The immunity of our transport service has been broken on one occasion only, and the losses of other large units are insufficient to justify an exaggerated estimate of the submarine danger.

Recent rumors of wonderful submarines both greater and smaller than any yet thought of must be received with due caution. They emanate from America, that land of big things, and reports in their passage across the Atlantic are liable to distortion. We have heard recently about a submarine which is to be propelled both on the surface and beneath it by internal combustion engines. The inventors seem to have forgotten, as the inventors of funnelless battleships forgot, that the products of combustion must be disposed of. If they are discharged under water the bubbles and disturbance at the surface will betray the presence of the enemy. But the greatest difficulty is to obtain adequate air supply for the engines, and the idea that it can be drawn through the periscope may be dismissed.—*The Engineer*, 15/9.

That submarine developments will have a notable influence on naval architecture is, of course, acknowledged by all Paris experts. The chief preoccupation of constructors has been to design ships excelling likely rivals in the matter of guns and armor, and in a position to repel torpedo attacks at long range. In our dreadnoughts an effort has been made to reduce the target by the suppression of heavy masts, and small artillery has disappeared, the anti-torpedo battery being made up of numerous 5.5-inch weapons some six meters above the water-line. Now, it is not improbable that the experience of the war will lead to important changes in these respects, a view which is supported by the following considerations. Immunity against submarine attacks cannot be gained by passive protection (armor and "compartmenting") alone, however improved, for the reason that the torpedo is bound to increase in size and destructive power, and even screens of destroyers can hardly be said to afford a complete defence, owing to the mobility of underwater enemies. Therefore, it is highly desirable that future warships should be able to look after themselves, and, to that

end, be specially fitted to detect approaching submarines and direct on them a hail of shells (specially designed) fired, if possible, from great heights. The pagoda-like masts of the *Jaureguiberry* and *Bouvines*, for instance, have provided advantageous stations for submarine watching, and much is said in favor of numerous batteries of small quick-firers distributed as in the British *Agamemnon*. It is not unlikely these discarded features of fighting ships will be revived, in a modified form, in new units, in the light of the requirements of active anti-submarine defence. Guns of 5.5 and 6-inch bore, available for general use, generally lack command and volume of fire, and the ideal submarine destructors are held to be 3, 6, and 9-pounder weapons on superstructures or fighting tops. Kites of the Saccony type tried with success in the *Quinet*, that have over fixed balloons the advantage of being available for use at high speed, also offer means of considerably enlarging the range of vision. In some quarters, it is believed some sort of torpedo-shells, similar to the obus-torpille Perruchon tested in the *Neptune*, will ultimately be evolved that will strike the submarine submerged at several meters below the surface. The future will show how much these expectations are justified, but the fact that the best constructional talent available, both in France and in England, is being employed against them, cannot but limit the capabilities of submarines.—*Naval and Military Record*, 29/9.

AERONAUTICS

GOVERNMENT TO BUILD GIANT AEROPLANE.—Secretary Daniels, on October 27, signed an order for the construction in the navy yard, at Washington, of the largest aeroplane ever built in this country, a plane even larger than the ordinary types in service in Europe.

The proposed plane, work on which will be begun immediately, will have a speed of from 50 to 80 miles an hour, will have a full load capacity of 6000 pounds and a useful load capacity of 2200 pounds. The latter load can be distributed between passengers, fuel and weapons. There will be two 160-pound motors, manufactured by contractors, and though it is not definitely stated, it is expected that the plane will carry at least one 3-inch gun. The government experts state that the big plane will be able to fly seven hours at the maximum speed.

Several planes of this type are to be constructed at the Pensacola plant, but the first one will be perfected at Washington, because of the superior testing facilities afforded by the wind tunnel and the model basin.

The preliminary work has been in progress for several months in the Bureaus of Construction and Repair and Steam Engineering under the immediate direction of Naval Constructor H. C. Richardson, U. S. N., an air pilot who has made a close study of aeronautics during the last two years.—*Aerial Age Weekly*, 8/11.

FLIGHT FROM DECK OF "NORTH CAROLINA."—Franklin D. Roosevelt, Assistant Secretary of the Navy, announced to-night that the aeroplane launching device that had been under test at the aeronautic station at Pensacola for some time has finally been installed on the cruiser *North Carolina*, and that on Friday an aeroplane was successfully launched from this device while the *North Carolina* was under way.

It was the first time an aeroplane ever had been launched from a ship under way, and represented the culmination of a series of experiments which started in 1912. The launching device, or catapult, was first suggested and tried out by Captain W. I. Chambers, U. S. Navy, who was then in charge of aviation. The first device was made and tested at the Washington navy yard, but was purely experimental and rather crudely built, simply to demonstrate the principle.

Two successful flights were made from this launching device. A new and improved device was constructed and shipped to the aeronautic station at Pensacola, where it was installed on a barge and put through a complete series of tests before being placed aboard the *North Carolina*. Several successful flights by different aviators were made. The flight from the *North Carolina* was made in navy aeroplane *A B 2*, with Lieutenant Commander H. C. Mustin as pilot.

The launching device is in the form of a car propelled along a track, the aeroplane being secured to the car until it reaches the end of the track. When the car stops the aeroplane is released and proceeds under its own power in flight. The aeroplane is landed on the car, fastened in place, and the motor started. The aviator takes his place in the aeroplane, and when all is ready the car is propelled along the track at a gradually increasing speed up to about 50 miles an hour, when the car is brought to a standstill and the aeroplane released.—*N. Y. Times*, 7/11.

NEW AIR MACHINES (GUNPLANES).—The French have always taken the lead in aviation generally, and in the development of aircraft, and especially of aeroplanes. Their aviators have from the very beginning of the war proved themselves far more than a match for the German airmen, and the raids they have originated and the reprisals they have made have carried fear of the French aviators far behind the German lines. We have now been informed of the extraordinary efforts which for some time past the French have been making, and the effects of which are now so plainly visible, to create new types of aeroplanes, not only of small and very swift biplane-destroyers, but of great super-planes, giants among this type of aircraft, mighty triplanes, *avions de bombardement*, having a wing-spread of 70 feet, capable of carrying 12 men and armed with four 1½-inch guns. These have a speed of 80 miles an hour, whole squadrons of them are already leaving for the front, and their rôle will be the bombardment from the air of enemy positions, as an accompaniment and valuable aid to bombardment by guns on the ground. The new small biplane will be armed with a machine gun and will perform the duties of air-scout, and a prominent feature of these craft is the ease and rapidity with which they rise from the ground to a great height into the air, while, since they carry only one man who combines the duties of observer, pilot and gunner, the machine can be maneuvered in safety without using the hands. Machines, however, are of no use without very highly trained specialists to drive them, and France is creating and organizing a large and competent corps of airmen, who are moreover being turned out in less than half the time than, during those pre-war days which we seem now to have left so far behind us, was considered the minimum within which pilots could be made.—*Army and Navy Gazette*, 16/10.

LAUNCHING OF NEW YORK NAVAL MILITIA'S FIRST HYDRO-AEROPLANE recently took place in New York City. The craft was presented to the naval militia by Henry A. Wise Wood, vice president of the Aero Club of America, on behalf of Glenn H. Curtiss and the National Aeroplane Fund. The hydro-aeroplane is of the type used by the United States Navy, and is driven by a 100 horse-power motor.—*Scientific American*, 13/11.

FLASHLIGHT SIGNALLING FROM AIRCRAFT.—There has been perfected in the United States an electric flashlight intended for signalling from an airship. The device is small and light, and its flashes can be read at a distance of from six to eight miles in daylight when the sun is shining. Obviously, the signalling range is even greater at night. The shutter mechanism is simple and rugged, and with it a speed of from 20 to 30 words per minute can be attained by a skilled telegraph operator. Current for the electric bulb is supplied either from storage cells or from a generator driven by the airship motor.—*Scientific American*, 13/11.

TRANSATLANTIC LINER AS MOTHER SHIP FOR SEAPLANES.—The well-known American war correspondent and writer, Frederick Palmer, in writing of his recent visit to the British grand fleet makes the following statement: "The seaplanes which were sailing over the fleet had their home on a famous Atlantic liner, which has carried many thousands of passengers." The earlier practice of detailing several seaplanes to each warship has evidently been abandoned in favor of a single and central mother ship especially equipped for taking care of these craft. In the Dardanelles operations a mother ship has been used since the beginning, the *Royal Ark*, which has been especially equipped for its task.—*Scientific American*, 13/11.

INCREASED RANGE OF ANTI-AIRCRAFT ARTILLERY.—The past fifteen months of war in Europe have resulted in a remarkable advance of anti-aircraft artillery. Whereas, at the beginning of the conflict, the aviators considered themselves secure when flying at altitudes of 8000 feet, since the shrapnel burst some thousands of feet below them, there is attendant danger to-day even when flying at 10,000 feet. The range of the anti-aircraft guns has been steadily increased from below 5000 feet to over 10,000. It is becoming increasingly difficult for aeroplane observers to conduct effective reconnaissances owing to the great height at which they are compelled to fly over enemy positions.—*Scientific American*, 13/11.

IMPORTANT IMPROVEMENTS IN ENGLISH PRACTICE.—The British Advisory Committee for Aeronautics reports great progress in many directions in the development of aeroplanes. Investigations in relation to stability have led to definite improvements in ease of handling without loss of speed. Entirely new designs have been evolved. Tests of these show that, without sacrifice of controllability, it is possible to make the aeroplane inherently stable, and capable of flying satisfactorily without the use of the controls. In developing these machines, alterations were introduced in every portion and feature. New types of machines have been produced, embodying special features that military experience has shown to be desirable. Wireless and other methods of signalling have been studied, as well as gear by which bombs can be dropped with accuracy. Considerable improvement has also been made in motors, which are being produced by several manufacturers.—*Scientific American*, 13/11.

HUGE FRENCH TRIPLANES FOR OFFENSIVE OPERATIONS.—The ante-bellum military aeroplanes having been found inadequate for the carrying out of raids on an extensive and successful scale, the French have since the opening of the war been developing a type of giant aeroplane especially suited for carrying heavy bombs and suitable ordnance. The new type is in the form of a triplane, and is known as "l'avion de bombardment." It has a wing spread of some 70 odd feet, and the three superposed planes rise to a height of 20 feet. The nacelle of the giant triplane will comfortably hold 12 men, although the crew is ordinarily composed of but six men, viz., two pilots, who sit close together in the center of the car, two observers and two gunners. One pilot can operate the machine in an emergency. The triplane carries four 37-mm. (one and one-half inch) guns. Although no mention is made of the horse-power of the engine or engines required to propel the new aeroplane, it is safe to assume that it must be in the neighborhood of 300 or more horse-power, probably divided among two or three engines, since the aircraft is credited with a speed in excess of 80 miles per hour.—*Scientific American*, 13/11.

RADIO

TELEPHONING BY WIRELESS ACROSS THE ATLANTIC.—It is announced by the American Telephone & Telegraph Company that on several different occasions during the past two weeks its engineers have succeeded in

transmitting clear, understandable speech across the Atlantic Ocean, between the United States Government station at Arlington, Va., and the Eiffel Tower station at Paris, France, a distance of some 3800 miles. It is understood that the same apparatus was used as that employed in the recent Arlington to San Francisco and Hawaii tests. The present feat—although it was generally believed to be within the range of immediate accomplishment since previous tests demonstrated the possibilities of covering greater distances under less favorable conditions, in traveling from Arlington to San Francisco and Hawaii the waves passed over some 2500 miles of land and a number of tall mountain ranges—has caused much surprise. The Eiffel Tower station is a military establishment and handles a great volume of traffic between the seat of the French Government and the scattered forces of the republic, so that the use of the station at this time for the experiments was hardly believed probable. However, the engineers were permitted to use the station at certain intervals and for only a few moments at a time, which naturally made the conditions of the tests most difficult.—*Scientific American*, 30/10.

WIRELESS SHIP STATIONS.—The 7000 wireless ship stations in the world require over 15,000 licensed men to operate them, while over 1000 land stations with a working force of 3200 men are required to handle the business which originates on board or for these vessels. The records of the United States show that about 2000 amateurs have been licensed in the past few years to operate their own stations. All the best equipped warships carry wireless, and a fair estimate of the number of navy vessels at war so equipped is Great Britain, 500; Germany, 200; Italy, 200; France, 180; Russia, 110; Japan, 70; Austria, 60, and the United States over 300.—*Engineering*, 8/10.

CANALS

THE PANAMA CANAL.—Early in September there was an interruption of the traffic of this waterway, owing to the occurrence of another landslide. About September 12, the obstruction having been dealt with by the huge dredgers always kept ready for such emergencies, traffic was resumed, but eight days later another slide caused a fresh interruption. Seven days later again, when 50 ships were reported as being held up, it was hoped that the passage would be sufficiently clear to allow of transit being resumed on October 1. But when that date arrived it was said that the work of clearance would occupy "another week or ten days." But the movements of the soil continuing, it became advisable to explain that it would be unlikely that reliance could be placed on getting past the slide till November 1. Thus it became necessary to divert all vessels which were intending to pass through the waterway, and the authorities announced that ships would be allowed to transfer cargo across the isthmus by rail at three dollars a ton, including all charges. Finally, the mass affected by the slide having increased to some 10,000,000 cubic yards, the date of re-opening was postponed to January 1. The stoppage of traffic through the Canal is a great expense and loss to the United States Government. It also puts the shipowners affected to considerable inconvenience and loss. But in point of fact by the closing of the route at this juncture almost the whole world suffers. For already owing to the war there is a vast shortage of tonnage, what with the vessels which have been destroyed, those German and Austrian steamers which have been shut up because they dared not venture to face the cruisers of the Allies, and those which have been requisitioned by the British and other governments. The result has been that freights have gone up and the trade of the Allies and the neutral nations has been hampered by want of tonnage. The opening of the Canal somewhat relieved the situation, because it substantially shortened certain voyages and so

PANAMA CANAL CHOKED BY SLIDES. GAILLARD CUT LOOKING TOWARD MIRAFLORES LAKE

added to the efficiency of the world's mercantile marine. This closing down, which robs us of the advantage of the shortened route, comes at a most inopportune time and tends to still further increase the pressure on the fleets of merchantmen.—*Marine Engineering and Naval Architect*, November.

When the Panama Canal was blocked on October 5 there were 83 vessels awaiting passage. Of these, 45 were on the Atlantic side, with an aggregate of approximately 167,000 tons of cargo, and 38 were on the Pacific side, with approximately 189,000 tons of cargo.—*Shipping Illustrated*, 23/10.

HOW THE SLIDES DEVELOP AT PANAMA.—From among the many illuminating photographs which have been taken of the recent slides at Panama, we have selected one, which shows how the bottom has been upheaved above the surface of the water, to a height of over 45 feet above the bottom of the Canal. Broadly speaking, the moving mass comes down into the cut, either by sliding or by crushing. Where the material has been sloped at a deeper angle than that at which it can naturally stand, it keeps slipping off until the natural angle of repose has been reached. Another form of sliding occurs when the overlying material is resting upon rock or some

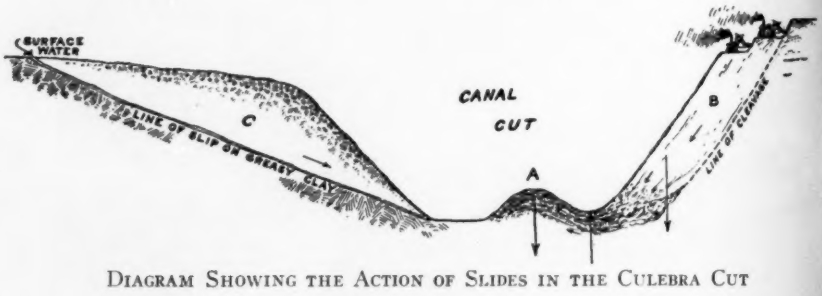

DIAGRAM SHOWING THE ACTION OF SLIDES IN THE CULEBRA CUT

harder material than itself, which slopes toward the canal. As the excavation is carried down, the overlying mass becomes so heavy as to overcome the frictional resistance between itself and the harder material beneath, and it commences to move into the excavation. The movement is frequently assisted by surface drainage water, which, trickling along the natural line of separation, lubricates the surface and assists the movement.

Another form of slide is that which is due to crushing or disintegration of the material. This occurs when the underlying rock is of poor quality, or is intersected by vertical seams or seams which slope toward the canal. As the depth of the excavation increases, the weight of the superincumbrance mass along the face of the cut becomes so great that the material at the foot of the excavation is crushed; it loses its cohesion, breaks up, and is pushed down and outward toward the center of the excavation. Being resisted by the reactive effect of the undisturbed floor and the opposite foot of the cut, the material is forced, sometimes, as high as 20 to 30 feet above the original bottom of the cut. Apparently in the case of the present slide, it has been forced up over 45 feet. The "hump," as it is called, "A" (see accompanying sketch) rises until a point is reached where an equilibrium is established between the weight of the hump and the weight of the sliding section "B" on the side of the cut, less the frictional resistance to movement along the line of cleavage.—*Scientific American*, 30/10.

COASTWISE CANAL NEW DEFENCE PLAN

WASHINGTON, November 1.

Senator Saulsbury of Delaware, has hit upon a plan of national defence which contemplates the widening and deepening of the Chesapeake and Delaware Canal and the extension of the canal across New Jersey to connect with New York harbor.

He would create an artificial waterway capable of accommodating war vessels as a means of increasing the navy defences. In this way the Senator believes that the United States could promptly concentrate its naval strength or send reinforcements to points of threatened attack.

Senator Saulsbury succeeded in having a resolution passed by the last Congress calling on engineers of the War Department for a report on the feasibility of the plan. He said to-day that the report is now in the possession of the Vice President, that it will be laid before the Senate as soon as possible and that it will recommend the plan as possessing the "very greatest value and military importance in the defence of our coast."

Senator Saulsbury says the report recommends not only the widening and deepening of the present canal system, but its extension to connect with New York harbor. He declares that such a canal would make almost impossible the landing of hostile troops at any point on the coast between the Narragansett and Chesapeake bays.

The strategic value of this canal is commended, Senator Saulsbury says, by the head of the War College and the Chief of the General Staff in addition to the Secretary of War and the army engineers.

Discussing the military advantages to be derived from the project, Senator Saulsbury added:

"We have no mean navy now, and I am glad to know or at least feel assured that we are to have a better and stronger one. If our present navy, or the better and stronger navy we intend to have, can be concentrated readily at any point from Narragansett Bay to the Virginia capes, if we can surely promove troops and munitions of war for the defence of this section of our Atlantic seaboard; if we can surely protect the great industries of the country in this section we are multiplying many times the efficiency of our national forces; if we may do this and at the same time enlarge our commercial facilities and cheapen transportation of the ordinary commodities in use by all our people, it seems to me no better line toward national preparedness can be followed.—*N. Y. Sun*, 2/11.

16-INCH GUN FOR CANAL.—The 16-inch gun to be eventually mounted for the defence of the Panama Canal left the Watertown Arsenal, Mass., November 4, en route to the proving ground at Sandy Hook to be tested. The gun was on two specially constructed cars, mounted on 14 trucks, and weighs 200 tons and its carriage 400 tons. The gun was made at Watervliet, N. Y., and was taken to Watertown to have the carriage fitted.—*Army and Navy Journal*, 6/11.

NET TONNAGE OF TRAFFIC THROUGH PANAMA CANAL.—The chart reproduced below shows graphically the relative tonnage of ship movements through the Panama Canal over the five great routes which constituted the course of over 97 per cent of the laden vessels passing through the canal to August 1, 1915. The remainder of the traffic is over miscellaneous routings and of vessels in ballast, the relative proportions of which are also shown. The chart shows the aggregate net tonnage (Panama Canal measurement) of vessels moving in each direction, from Atlantic to Pacific and from Pacific to Atlantic, over each route every month. The abscissae at top and bottom of the chart indicate net canal tonnage, in units of 10,000, and all the parts are drawn to scale.—*Shipping Illustrated*, 9/10.

KEY.
United States Coastwise Traffic
Between United States and Far East Including Australia
Between United States and South and Central America
Between Europe and West Coast of United States and Canada
Between Europe and South and Central America
Miscellaneous Traffic
Ballast
Westbound—13 Vessels
Eastbound—11 Vessels
Westbound—27 Vessels
Eastbound—30 Vessels
Westbound—44 Vessels
Eastbound—40 Vessels
Westbound—54 Vessels
Eastbound—38 Vessels
Westbound—43 Vessels
Eastbound—57 Vessels
Westbound—44 Vessels
Eastbound—54 Vessels
Westbound—39 Vessels
Eastbound—53 Vessels
Westbound—57 Vessels
Eastbound—80 Vessels
Westbound—59 Vessels
Eastbound—60 Vessels
Westbound—67 Vessels
Eastbound—75 Vessels
Westbound—83 Vessels
Eastbound—60 Vessels
Westbound—93 Vessels
Eastbound—77 Vessels
AUG.
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JULY
1914
1915

In the United States coastwise trade the Canal route is from 7663 to 8940 miles shorter than the route through the Strait of Magellan, depending on the ports between which the voyages are made. From New York to San Francisco is 5262 miles by the Canal, 13,135 by Magellan. In the South American trade, from New York to Iquique by the Canal is 4004 miles; by Magellan, 9143. Iquique is 6578 miles from Liverpool by way of the canal and 9510 miles by way of Magellan. To go from Balboa to Liverpool by way of Magellan means a voyage of about 11,500 miles, or 48 days at sea for a 10-knot vessel.—*Shipping Illustrated*, 23/10.

MISCELLANEOUS

EXPLOSION RISK OF DYNAMITE CARGOES.—Residents at Gravesend Bay and Sea Gate, and the owners of passenger vessels whose course took them near to the German dynamite ship which, since the opening of the war, has been moored off Bath Beach, will be gratified to learn that the consignees have ordered that the ship's cargo be unloaded and returned to the manufacturers. That the risk of explosion was more theoretical than real, is suggested by the fact that the ship laid at its present anchorage during the hot months of two summers without any mishap. The risk of detonation of such a cargo as this lies in the fact that the absorbent material which holds the nitro-glycerin is apt to permit the liquid to escape when exposed to heat. Instances have occurred where the nitro-glycerin, resulting from the deterioration of the powder, had soaked through the wooden boxes containing the dynamite. Nitro-glycerin can be readily detonated by being subjected to even a slight rubbing between two metal surfaces. If the boxes have exposed nail heads and there has been a leakage along the nails, there is an evident danger of the whole cargo being detonated through friction. An efficient safeguard against this, is the practice of some European explosive manufacturers of packing the dynamite in rubber-lined boxes, a provision which effectually prevents any escape of nitro-glycerin. Furthermore, in the case of large cargoes, such as the one in question, the boxes are so packed as to permit free ventilation, and most careful attention is paid to the temperature in the holds. Self-preservation is the first law of life; and it may be taken for granted that the captain and crew who sleep above a cargo of dynamite use every precaution, in the way of the frequent opening of hatches, artificial ventilation and constant inspection, to safeguard the ship against disaster.—*Scientific American*, 30/10.

DESTROYERS AND THEIR FUNCTIONS.—Summing up his conclusions on the work so far done in the war by destroyers, the *Herald's* naval correspondent in London declares in his interesting special cable printed Saturday that this type, though disappointing in some of the expectations of peace, has proved so valuable, even so indispensable in many important respects, that its future must be assured. He sees in it the primary auxiliary, the handmaiden of the fleet, as it can be employed for patrol duty, harbor and base defence and for reconnaissance and convoy service.

The changes in construction and equipment that will be forced by the experiences of the war must of course apply equally to the destroyer and the submarine. For example, such affairs of outposts as those off the Dutch coast, in the North Sea and, later, off Ostend, indicate the essential value of concentrated and superior gun-fire, of good displacement and of high speed. It appears wise, then, that according to government specifications the minimum battery must include four 4-inch pieces, several anti-aircraft guns and at least four triple torpedo-tubes. The 9- and 3-pounders of of the earlier type have become as obsolete as the swivels of Benbow's day.

It is such reasons, gathered from actual fighting, that will compel the destroyers to be large in number, to possess good armaments and high sustained sea speed. Notably they should be kept within the displace-

ments—roughly around 1200 tons—that make them the best examples of one type and not poor substitutes for another type from which entirely different duty is to be expected. Every jack to his trade.—*N. Y. Herald*, 22/10.

THE BATTLE CRUISER.—The question of the characteristics to be given to our future "croiseurs de bataille" has long been discussed and agreement has been arrived at on several points. The displacement is not to exceed 30,000 tons, the limit which ex-Chief Constructor Bertin has fixed to a really advantageous utilization of the displacement, and the British policy is held to harmonize with these views. It is considered highly desirable that the armament should be superior in the matter of caliber to that of contemporary battleships, superior hitting power at long range being the best way to make up for deficiencies in armor, which is the very advantage the British *Lions* (13.5-inch guns) possess over their German rivals (11- and 12-inch weapons), and even over all German battleships in service. A return to the 420-mm. guns of our early garde-côtes (*Terrible* class) is advocated in some quarters, whilst others, alive to the importance of wasting no time in lengthy experiments with new ordnance, are of opinion that the improved 13.4-inch weapon with heavier shells, that gave such splendid results when tested at Gâvres, answers all actual requirements in the matter of penetration at extreme range, and offers, besides, special advantages, as it permits the retention of quadruple turrets, which are turning out to be a great success in nearly every respect. Considering crushing end-on fire is the thing most needed in battle cruisers, some experts point out that two quadruple turrets placed "en échelon," as in the old British *Inflexible*, but, of course, on improved lines and with an arc of fire of some 300 degrees, would give our battle cruisers a superiority over all comers. This may be true, but, unfortunately, the French Navy, so bold in other directions, has always been adverse to the adoption of turrets firing athwartship.—*Naval and Military Record*, 13/10.

AGAIN THE MONITOR WAR TYPE.—The employment of the British monitors taken over from Brazil at the outbreak of hostilities proved so successful in the shoal water bombardments of the Belgian coast that the Admiralty began the multiplication of the type and now possesses an important flotilla of this design. Of late its duties have been extended further afield, for the advent of the German submarines in the Ægean and off Gallipoli was followed by such serious losses in capital ships that some immediate and less costly attack had to be assembled and other provision made for the support of the troops ashore. Hence, as a remedy of desperate defence, the new monitor.

The characteristics of the vessels have not been revealed with any exactness, but it is known they belong to three classes, and the essentials are based on the four vessels of the *Ozark* class turned out by us (under other names) about 1902. The smallest design mounts two 6-inch guns, the intermediate one 9.4-inch in the bow and one 6-inch at the stern, and the largest two 14-inch pieces disposed on a curious built-out underwater structure. So fully have these vessels satisfied the necessities as to warrant the contention that in exceptional circumstances they are "submarine proof warships."—*N. Y. Herald*, 4/11.

BRITISH SEA POWER.—The extension of the war zone to the coasts of Greece makes a new call on the naval resources. These sensational developments have brought home to French naval men the value of number, and the need of small cruisers. But for the wealth of the British Navy in vessels of that class, as well as in large ocean-going destroyers, the French marine would have had reasons to bitterly regret her total neglect of "croiseurs légers" during the last fifteen years. Notwithstanding the fact that superior quality remains the main asset of sea supremacy, quantity

in the matter of fighting units has become, mostly as the result of submarine developments, a factor of paramount importance, so much so that the mercantile navy has proved a valuable, and even indispensable, auxiliary to the "flotte de combat," and will need henceforth to be reckoned as one of the constitutive elements of naval power; which will have the effect of further adding to the predominance of Great Britain on the sea. Armed liners, like the *Savoie* and *Lorraine*, have been officially commended for the excellent work their reservist gunners have performed in the Levant, and they satisfactorily fill the rôle of costly protected criusers, which is also true, to an even greater extent, of the numerous auxiliary cruisers. A further lesson the war has taught is that number is liable to be of little avail without well-appointed points d'appui and repairing bases, where squadrons and flotillas may recuperate and prepare for renewed action. It was the knowledge of this truth which was at the bottom of the German desire for a vast colonial empire with well-situated strategic bases, that would have been so great a stride towards the establishment of "Germany's future on the sea."—*Naval and Military Record*, 13/10.

BRITISH NAVAL HISTORY REPEATING.—The British Navy of to-day will have followed strictly in the footsteps of the great men of Nelsonian days if it meets and defeats the main forces of the enemy in—January, 1917! That would be 29 months after the outbreak of war. The story of the blockades by which we held the command of the seas in those days—Toulon, Cadiz, Ferrol, Rochfort, and Brest—is the greatest story in naval history, far surpassing in its courage, seamanship, and all-round good management the story of any sea fight; and however long or little our fleets may have to wait now for "The Day," the story of their long watch will be no less worthy a tribute to the officers and men who share it. Nelson's men had to face the discomforts of crowded, weather-mastered wooden ships, poor food, and a lack of facilities for recreation difficult to realize to-day. But the mess deck of a modern ship of war is not a palace for comfort, and while steam vessels can drive against most weathers, even the biggest of them do not escape the attendant discomforts; and—a point too often missed by shore-keeping folk—all warships are not super-dreadnoughts with a bulk of 25,000 tons and a beam of 90 feet. For sheer heroism give me the *Pegasus* before the battle of Trafalgar; for pluck under the most distressing and uncomfortable conditions give me the patrol service, 1915, before the blockade of Toulon; and for seamanship I ask nothing better than the story of Captain Pillar and the Brixham trawler *Provident*. For the rest, I remember that Nelson never had to concern himself with the latitudes in which the bulk of our fleet will find itself during the coming winter.—*Naval and Military Record*, 13/10.

American ships registered for the foreign trade on June 30, 1915, numbered 2768, of 1,813,775 gross tons, an increase of 737,623 gross tons over American shipping for foreign trade at the end of the fiscal year 1914. This is about triple the increase in registered tonnage for any previous year in American history. Our registered tonnage is now much greater than at any time since 1863, when we had 2,026,114 gross tons in foreign trade. It is many times more efficient, however, as the steam tonnage now amounts to 1,273,067 gross tons, while in 1863 it amounted to only 133,215 tons.—*N. Y. Times Magazine*, 7/11.

THE COST OF NAVAL TONNAGE.—Popular fallacies die hard. It is still believed by many people here in the United States that it costs more to build naval ships here than in foreign countries. So-called experts and writers in the daily and periodical press continue to refer to the greater cost of materials and labor in our private as well as government shipbuilding plants in their efforts to explain away the incongruity of American

inability to compete with European shipbuilders. The following figures will be illuminating to those who know something of our shipbuilding organizations.

Great Britain leads in low cost of building dreadnoughts, the price per ton of her capital ships, known as *Type 6*, and which are comparable to our *Arizona* class, being only $450 per ton while the *Arizona* is costing $502 per ton. In contrast with our high cost compared to the British, is the cost of the German ships of the *Moltke* type which is $525 per ton, a considerable increase for German efficiency over its British rival, but in French yards, the ships of the *Courbet* type cost $565 per ton.

These figures show that economically Great Britain still rules the waves, with the United States a good second and Germany a poor third. But the point of importance for us is that American mechanical ingenuity is rapidly creeping up on the British advantage, and in time we should be able to seriously threaten this competitive advantage in spite of our higher wage scale and higher cost of materials.—*Seven Seas*, November.

WHAT THE BRITISH NAVY IS DOING.—Why doesn't some paper borrow the idea of a certain newspaper which shall be nameless, and tell the country every morning what the navy is doing? As thus: Monday—"The navy has enabled us to purchase £——— worth of munitions in America for use against Germany." Tuesday—"Thanks to the navy we are keeping our men on all fronts well supplied with stores of all descriptions, and are more than making good the wastage of men." Wednesday—"Thirteen hundred ships arrived in British ports with food, raw materials, and munitions of war—thanks to the navy." Thursday—"A German submarine was sighted off ——— yesterday, but no one will sight it any more—thanks to the navy." Friday—"There are scores of thousands of army-trained Germans in neutral countries oversea, and hundreds of factories ready to turn out munitions for the enemy; but neither men nor munitions can get to Germany—thanks to the navy." Saturday—"The navy has brought England safely to the end of another week; for its own part, it hopes for a little excitement before Monday morning."—*Naval and Military Record*, 13/14.

NAVAL PRINCIPLES.—We hope the subscribers of the *North American Review* will "read, mark and inwardly digest" the article in the November number by Rear Admiral Bradley A. Fiske, U. S. N., on "Naval Principles." The admiral shows that in all cases of a dispute between two peoples and their rulers which ended in war the decision went to the side that could exert the most force at the critical times and places. The rôle of armies and navies has not been to provoke wars, but to wage wars when civilians had decreed them and by waging them to finish them. The admiral seeks to dispel the illusion that army and navy officers are eager for war in order that they may get promotion. His acquaintance with army and navy officers for 45 years enables him to say positively that barring exceptions they do not desire war at all. Though an officer may be under the professional necessity of facing death he is subject to the same emotions as other men; he has the same dread of death and the same horror of leaving his family unsupported after his death. The admiral considers briefly the four naval wars in which the United States has engaged, and the Russo-Japanese War to establish his propositions. "These wars show us, as do all wars in which navies have engaged, that the function of a navy is not only to defend the coast in the sense of preventing an enemy from landing on it, but also to exert force far distant from the coast. The study of war has taught its students for many centuries that a merely passive defence will finally be broken down, and that the most effective defence is the 'offensive-defensive.' Perhaps the clearest case of a correct offensive-defensive is Nelson's defence of England, which he carried on in the Mediterranean, in the West Indies, and wherever the

enemy fleet might be, finally defeating Napoleon's plan for invading England —not by waiting off the coast of England, but by attacking and crippling Napoleon's fleet off the Spanish coast near Trafalgar." To prevent actual invasion is a much easier task than to prevent the enemy from shutting us out from intercourse with the outside world and thus interfering with our free commerce on the seas, on which the prosperity of the country so largely depends. The admiral concludes by considering the proper equipment of our navy, presenting the reasons for building a small number of large ships rather than a large number of small ships. The fleet must be composed of various types of vessels, but the battleship should be the primary or paramount type and the others secondary, because the battleship is the type that can exert the most force, stand the hardest punishment, steam the farthest in all kinds of weather, and in general, serve her country the best. There is no doubt in the minds of naval men that the rôle of aircraft is to be important and distinguished, but precisely what that rôle will be cannot yet be determined.—*Army and Navy Journal*, 30/10.

REQUIREMENTS OF A BATTLE FLEET.—Describing the requirements of a battle fleet, Rear Admiral Bradley A. Fiske, U. S. N., says in the article in the *North American Review* for November referred to last week:

"There are two main reasons for building a small number of large ships rather than a large number of small ships. The first reason is that large ships are much more steady, reliable, safe and fast than small ships. The second reason is that, when designed for any given speed, the large ships have more space available for whatever is to be carried; one 15-knot ship of 20,000 tons normal displacement, for instance, has about one and a half times as much space available for cargo, guns and what not as four 15-knot ships of 5000 tons each. These two reasons apply to merchant ships as well as naval ships. A third reason applies to naval vessels only, and is that a few large ships can be handled much better together than a large number of small ships, and embody that 'concentration of force' which it is the endeavor of strategy and tactics to secure. A fourth reason is the obvious one that large ships can carry larger guns than small ships.

"A contest has been going on between torpedo makers and naval constructors like the contest between armor makers and gun makers, and that just now the torpedo makers are in the lead. For this reason a battleship needs other protection than that imparted by its cellular subdivision. This is given by its 'torpedo defence battery' of minor guns of about 5-inch caliber.

"Most torpedoes are to be found in destroyers—long, fast, frail vessels, averaging about 700 tons displacement, that are intended to dash at enemy ships at night, or under other favorable conditions, launch their torpedoes and hurry away. The torpedo is 'a weapon of opportunity.' It has had a long, slow fight for its existence; but its success during the present war has established it firmly in naval warfare.

"The submarine was designed to accomplish a clear and definite purpose —a secret underwater attack on an enemy's ship in the vicinity. It has succeeded so well in its limited mission that some intelligent people declare that we need submarines only—ignoring the fact that, even if submarines could successfully prevent actual invasion, they could not carry on operations at a distance from their base of supplies. It is true that submarines may be made so large that they can steam at great speed from place to place, as capital ships steam now, carry large supplies of fuel and food, house their crews hygienically, and need no 'mother ship' or tender. But if submarines achieve such size they will be more expensive to build and run than battleships—and will be, in fact, submersible battleships. In other words, the submarine cannot displace the battleship, but may be developed and evolved into a new and highly specialized type of battleship.

"The menace of the destroyer—due to the seaworthiness which this type has now achieved, and to the great range which the torpedo has acquired—has brought about the necessity of providing external protection to the battleships; and this is supplied by a 'screen' of destroyers and other light craft whose duty is to keep enemy destroyers and (so far as is practicable) the submarine at a safe distance.

"We now see why a fleet must be composed of various types of vessels. At the present moment the battleship is the primary or paramount type, the others secondary; because the battleship is the type that can exert the most force, stand the hardest punishment, steam the farthest in all kinds of weather, and, in general, serve her country the best.

"The fleet needs to have a means of knowing where the enemy is, how many ships he has, what is their character, the direction in which they are steaming and their speed. To accomplish this purpose 'scouts' are needed —fast ships that can steam far in all kinds of weather and send wireless messages across great distances. So far as their scout duties go, such vessels need no guns whatever, and no torpedoes; but because the enemy will see the scout as soon as the scout sees the enemy, and because the enemy will try to drive away the scout by gun and torpedo fire, the scouts must be armed. And this necessity is reinforced by the necessity of driving off an enemy's scouts. In foreign navies the need for getting information in defiance of an enemy's attempts to prevent it, and to drive off the armed scouts of an enemy, has been one of the prime reasons for developing 'battle cruisers,' that combine the speed of the destroyer with the long steaming radius of the battleship, a battery almost as strong, and a very considerable protection by armor."—*Army and Navy Journal*, 6/11.

THEORY OF LEAST SQUARES IN TRIANGULATION.—The U. S. Coast and Geodetic Survey has issued a publication dealing with the application of the theory of least squares to the adjustment of triangulation. It has not been prepared with the idea of displacing the textbooks in dealing with the subject of least squares, but of supplementing these in the special field of triangulation. It will be of much use to one who is beginning work of this kind. Concrete examples of adjustments are given, ranging from some of the easiest to those that are more difficult. The book deals principally with office computations, but it will also be found useful to those in charge of field work.

A development is given, expressed in the symbolism employed in the office of the survey at the present time, for the condition equations necessary to effect the closure in geographic positions of a loop. A need for this has been felt for some time past. A method of adjustment by the variation of the geographic coordinates (latitude and longitude) of the various points has been developed and applied to the adjustment of several figures. This is a method which has not before been used in the United States, although something similar is regularly employed in Canada.

At the end of the publication there is given a new development of the formulas for the computation of differences of elevation from the observations of zenith distances. These formulas take into account some of the effects due to the lengths and heights of the lines that were not taken into consideration in the development previously in use in the coast and geodetic survey.

The volume is published in octavo size and is illustrated. It is Serial No. 9, Special Publication No. 28, and may be obtained free of charge by application to the Division of Publications, Department of Commerce, Washington, D. C.—*Shipping Illustrated*, 30/10.

NAVY MOTOR BOAT.—Upon the recommendation of Rear Admiral Joseph Strauss, Chief of Ordnance, the Navy Department has decided to purchase a high power motor boat for experimental purposes to develop the value of this type of craft in protection against submarine raids. Naval observers

in England report that the British have made splendid use of these fast motor boats in their successful campaign which drove the German *U* boats out of British waters. It is altogether likely that the trial work to be done with this motor boat to be bought by the Navy Department will result in the addition of this type of craft to the regular naval building program. The motor boat which the Navy Department will purchase will be thoroughly seaworthy and equipped with one 18-inch torpedo-tube and one 1-pounder rapid-fire gun. Its estimated cost is $30,000. Designs for the vessel have already been prepared.—*Shipping Illustrated,* 13/11.

NEW FIELD TELEPHONE AND BUZZER OF U. S. ARMY.—The United States Signal Corps has recently invented a new form of field telephone and buzzer which will hereafter replace the field buzzer, cavalry buzzer and field artillery telephone. The buzzer is strictly a portable instrument for use in the field. It can be employed as a telephone until a break in the line renders this method of communication inoperative; the buzzer method of signaling in the Morse or Continental telegraph codes then being resorted to. When used in the latter manner, the signals are received at the other end of the line in the form of a high pitched hum, broken up to form the dots and dashes of the codes. The line consists of a single wire laid on the ground. The wire is wound on a reel held in a special framework on a soldier's back. The soldier, walking rapidly in the direction in which the line is to be laid, pays out the wire as needed. A simple ground connection is used at both stations for the return circuit. Even with the line severed, it is possible to maintain buzzer communication.—*Scientific American,* 6/11.

GERMAN IRON MONEY.—According to a recent ordinance of the Bundesrat, the Imperial German Chancellor is empowered to authorize the coining of 5-pfennig pieces out of iron to the value of 5,000,000 marks. These coins are to have a milled edge and will contain the words "Deutsches Reich" over the figure "5" and the word "pfennig" under it, followed by the date. The obverse will have the usual stamp of the imperial coat-of-arms. The new coins are to replace those now made of nickel and copper, and they shall be withdrawn from circulation not later than two years after the conclusion of the present war.—*N. Y. Times Magazine,* 7/11.

PROGRAM OF NAVAL ARCHITECTS' MEETING.—A partial list of the papers to be read at the twenty-third annual meeting of the Society of Naval Architects and Marine Engineers, in New York, on November 18 and 19, is as follows:

"Aerodynamical Experiments upon a Yacht's Mainsail." By Professor H. A. Everett.

"Inland Navigation and Barge Construction *vs.* Floating Bridges." By J. H. Bernhard.

"The Variation in Frictional Resistance of Ships with Condition of Wetted Surface." By Naval Constructor Wm. McEntee, U. S. N.

"The Determination of the Resistance of Ships." By E. H. Rigg.

"Results of Model Tank Experiments to Determine the Action of a Ship Brake." By Captain Wm. Strother Smith, U. S. N.

"Some Comparisons Relating to Electric Propulsion of a Battleship." By W. L. R. Emmet.

"Interior Decoration of Vessels." By Harry B. Etter.

"Data on Hog and Sag of Merchant Vessels." By T. M. Cornbrooks.

"Period of Vibration of Steam Vessels." By Wm. Gatewood.

"The Application of Small Steam Turbines for Auxiliary Purposes on Board Ship." By W. J. A. London and F. D. Herbert.

"The Maintenance of the Fleet." By Captain A. P. Niblack, U. S. N.

"The Submarine of To-day and To-morrow." By L. Y. Spear.

"Superheated Steam in Marine Practice." By H. B. Oatley.

The meetings will be held in Assembly Room No. 1, Engineering Societies Building, 29 West Thirty-ninth street, beginning at 10 a. m. each day of the meeting.

The Council of the Society will meet in the Engineering Societies Building at 3 p. m. on November 17 and the annual banquet will be held at the Waldorf-Astoria Hotel on Friday evening, November 19.—*International Marine Engineering*, November.

DERELICT

A REMINISCENCE OF "TREASURE ISLAND"

BY YOUNG E. ALLISON

Fifteen men on the dead man's chest—
Yo-ho-ho and a bottle of rum!
Drink and the devil had done for the rest—
Yo-ho-ho and a bottle of rum!
(Cap'n Billy Bones his song.)

Fifteen men on the dead man's chest—
Yo-ho-ho and a bottle of rum!
Drink and the devil had done for the rest—
Yo-ho-ho and a bottle of rum!
The mate was fixed by the bos'n's pike,
The bos'n brained with a marlinspike
And Cookey's throat was marked belike
It had been gripped
By fingers ten;
And there they lay,
All good dead men,
Like break-o'-day in a boozin'-ken—
Yo-ho-ho and a bottle of rum!

Fifteen men of a whole ship's list—
Yo-ho-ho and a bottle of rum!
All of 'em down from the devil's own fist—
Yo-ho-ho and a bottle of rum!
The skipper lay with his nob in gore
Where the scullion's axe his cheek had
shore—
And the scullion he was stabbed times four.
And there they lay,
And the soggy skies
Dripped all day long
In up-staring eyes—
At murk sunset and at foul sunrise—
Yo-ho-ho and a bottle of rum!

Fifteen men of 'em stiff and stark—
Yo-ho-ho and a bottle of rum!
Ten of the crew had the Murder mark—
Yo-ho-ho and a bottle of rum!
'Twas a cutlass swipe, or an ounce of lead,
Or a yawing hole in a battered head—
And the scuppers glut with a rotting red.
And there they lay—
Aye, damn my eyes!—
All lookouts clapped
On paradise—
All souls bound just contrariwise—
Yo-ho-ho and a bottle of rum!

Fifteen men of 'em good and true—
Yo-ho-ho and a bottle of rum!
Every man jack could ha' sailed with Old Pew—
Yo-ho-ho and a bottle of rum!
There was chest on chest full of Spanish gold,
With a ton of plate in the middle hold,
And the cabins riot of stuff untold.
And they lay there
That had took the plum,
With sightless glare
And their lips struck dumb,
While we shared all by the rule of thumb—
Yo-ho-ho and a bottle of rum!

More was seen through the sternlight screen—
Yo-ho-ho and a bottle of rum!
Chartings ondoubt where a woman had been—
Yo-ho-ho and a bottle of rum!
A flimsy shift on a bunker cot.
With a thin dirk slot through the bosom spot
And the lace stiff-dry in a purplish blot.
Or was she wench . . .
Or some shuddering maid . ?
That dared the knife
And took the blade!
By God! she was stuff for a plucky jade—
Yo-ho-ho and a bottle of rum!

Fifteen men on the dead man's chest—
Yo-ho-ho and a bottle of rum!
Drink and the devil had done for the rest—
Yo-ho-ho and a bottle of rum!
We wrapped 'em all in a mains'l tight,
With twice ten turns of the hawser's bight,
And we heaved 'em over and out of sight—
With a yo-heave-ho!
And a fare-you-well!
And a sullen plunge
In the sullen swell
Ten fathoms deep on the road to hell—
Yo-ho-ho and a bottle of rum!

—*From Seven Seas.*

NAVAL MILITIA NOTES

Prepared by LIEUTENANT A. S. CARPENDER, U. S. NAVY

The first naval militia organization in the United States was established in the state of Massachusetts as a part of the organized militia of that state on March 29, 1890. The establishment of organizations in other states followed, until on July 1, 1915, there were naval militia organizations in 21 states and the District of Columbia, with a total strength of 8312 officers

and enlisted men divided among the various states as shown in the following table:

STRENGTH OF THE NAVAL MILITIA, JULY 1, 1915

State	Officers	Enlisted Men	Total	Total Strength allowed by the State and District of Columbia law
California	64	785	849	1260
Connecticut	19	306	325	340
District of Columbia	12	211	223	263
Florida	11	78	89	425
Illinois	41	582	623	1217
Louisiana	28	285	313	800
Maine	11	154	165	....
Maryland	18	184	202	364
Massachusetts	46	651	697	698
Michigan	37	392	429	600
Minnesota	27	377	404	350
Missouri	18	220	238	348
New Jersey	30	430	460	554
New York	90	1341	1431	2000
North Carolina	49	333	382	501
Ohio	20	258	278	Unlimited
Oregon	12	168	180	1000
Pennsylvania	15	161	176	775
Rhode Island	14	189	203	260
South Carolina	15	207	222	....
Washington	20	310	330	500
Wisconsin	9	84	93	319
Total	606	7706	8312	

NOTE.—Texas and Hawaii now being organized.

In 1891 there was included in the Naval Act, as passed by Congress, an appropriation of $25,000.00, called "Arming and Equipping Naval Militia." This constituted the first federal appropriation for the naval militia, and was available for the purchase of arms, equipment, etc., for naval militia training. Similar appropriations have been included annually in the Naval Act since that time.

Ships were loaned to the organizations and material and equipment issued by the various bureaus of the Navy Department for training purposes, the details being carried on by the "Office of Naval Militia." The states themselves purchased clothing and equipment, and some was loaned by the War Department. Annual practice cruises were made, and the training of the naval militia gradually progressed.

On February 16, 1914, "An Act to Promote the Efficiency of the Naval Militia and for Other Purposes," commonly known as the "Naval Militia Act," became a law, and is the act under which the naval militia is now operating. In accordance with this act, the Division of Naval Militia Affairs was, on April 12, 1914, established by Navy Department General Order No. 93, and as a result of this order, took over all work formerly performed by the "Office of Naval Militia." The control of the naval militia was, by the provisions of the Naval Militia Act, placed to a large extent under the supervision of the Navy Department, and it has been made possible for the department to build up an organization which will be of great benefit to the navy. When it is realized that a large personnel will be needed as an auxiliary to the navy in time of war, and especially in view of the fact that by the terms of the act, the naval militia or any existing reserve, must be

called out before volunteers, the need of an efficient naval militia can be fully realized, and the creation of an efficient naval militia is the object towards which the efforts of the department are being devoted.

A National Naval Militia Board, composed of five naval militia officers, representing the North Atlantic, South Atlantic, Pacific and Great Lakes regions, was appointed by the Secretary of the Navy on June 2, 1914. This board convenes in Washington as often as necessary, and is freely consulted in all important naval militia matters.

Inspections of all naval militia organizations and divisions are required by the Naval Militia Act, to be made annually by officers of the navy, to determine whether or not the divisions are sufficiently armed, uniformed and equipped to participate in the allotment of federal funds for the ensuing year. The first of these inspections was made in the spring of 1914, and as a result, several divisions were disbanded.

The naval militia of Indiana composed of cadets at the Culver Naval School, Culver, Ind., lapsed in the spring of 1914, due to the fact that its personnel did not conform to the terms of the Naval Militia Act.

The Secretary of the Navy on May 22, 1914, appointed a board of naval officers for the purpose of formulating examinations for officers and enlisted men, and standardizing, in accordance with the Naval Militia Act, the qualifications of the naval militia personnel. This board met in Washington and, assisted by the National Naval Militia Board, formulated a report which was approved by the department, and has been published to the service in the form of General Order No. 153. This general order establishes the units of organization, distribution of personnel, and other matters which, in accordance with the act, the Secretary of the Navy is authorized to prescribe.

(a) The "unit of organization" as follows:
  (1) For the deck force—a division.
  (2) For the engineer force—a division.
  (3) For the aeronautic force—a section.
  (4) For the marine corps—a company.
  Aeronautic divisions and marine sections are also authorized.

(b) Larger units for administrative and other purposes:
  (1) Brigade organization.
  (2) Battalion organization.

(c) The classes of line officers:
  (1) Line officers (line duties only).
  (2) Line officers (engineering duties only).
  (3) Line officers (aeronautic duties only).

(d) Other corps of the naval militia as follows:
  (1) Medical officers.
  (2) Pay officers.
  (3) Chaplains.
  (4) Marine officers.
  (5) Chief boatswains and boatswains.
  (6) Chief gunners and gunners.
  (7) Chief machinists and machinists.
  (8) Chief carpenters and carpenters.
  (9) Chief pharmacists and pharmacists.
  (10) Chief pay clerks and pay clerks.

(e) The rate of chief petty officers, petty officers and other enlisted men (naval branch), and the rank of non-commissioned officers (marine corps branch) allowed the naval militia.

(f) The number and grade of all officers for deck divisions, engineer divisions, aeronautic divisions, aeronautic sections, marine companies and marine sections.

(g) The number and rank or grade of all officers allowed on:
  (1) Brigade staffs.
  (2) Battalion staffs.

(h) The number and rate of all chief petty officers, petty officers, and other enlisted men allowed in each deck division, engineer division, aeronautic division, aeronautic section, and the number and rank of all non-commissioned officers in each marine company and marine section.

(i) The number and rate of chief petty officer, petty officer and other enlisted men allowed for brigade and battalion staffs.

(j) Allowance of shipkeepers for vessels loaned to the naval militia.

(k) The scope of examinations for all officers of the naval militia of all ranks and grades.

(l) Stage examinations for all officers of the naval militia with the understanding that if an officer passes any part of an examination he will not be re-examined on this part.

(m) The qualifications that an officer must possess in order that he may assume sole charge of a vessel loaned to the naval militia under the agreement entered into between the State and Navy Department.

(n) The qualifications that an officer must possess in order that he may assume sole charge of the engines, boilers and machinery of a vessel loaned to the naval militia under the agreement entered into between the State and the Navy Department.

(o) Boards to be known as "Naval Militia Examining Boards," to sit in Washington, D. C., to prepare questions and mark examination papers of officers of the naval militia coming up for examination.

(p) The examination of all chief petty officers, petty officers and other enlisted men of the naval militia (naval branch) and the non-commissioned officers (marine corps branch) by officers of their respective branches in the naval militia, and reports submitted thereon to the Division of Naval Militia Affairs.

The physical examinations for officers and enlisted men of the naval militia have been published in the form of Navy Department General Order No. 150.

These two general orders constitute the most important action which the navy department has taken for the creation of an efficient naval militia. The adoption and compliance with the provisions of these general orders, by all states and territories having naval militia organizations is a requisite in order that the naval militia of their states may be called forth without further professional examination, in time of war.

A tactical signal book for the naval militia has been prepared and issued. This signal book is for use in instructing the naval militia in signalling and for use on falling in with other naval or naval militia vessels.

Gunnery instructions have been compiled and rules laid down for naval militia target practice. An "Organization Trophy" and a "Division Trophy," to be competed for annually, have been offered by the Navy Department, for the organization and division making the highest score in target practice during the year. The fiscal year 1915 was the first year during which these trophies were competed for. The "Organization Trophy" was won by Illinois, and the "Division Trophy" by the 1st Division, 2d Battalion, Ohio.

The training of the naval militia consists in armory instruction during the winter months; small arms target practice, short week-end cruises on vessels loaned to the naval militia organizations; and an annual cruise of about 15 days duration on vessels of the regular navy and vessels loaned to the organizations. These annual cruises of 15 days comprise the most important feature in the naval militia training and an effort is made to teach both officers and enlisted men the elementary principles of life on board ship, and to put into actual practice the instruction they have received during the winter months. While performing such cruises the naval militia receive the same pay, transportation, and subsistence allowed officers and enlisted men of the regular navy. Officers and enlisted men are also authorized, on application of the governors of the states and authority of the Secretary of the Navy, to participate in target practice and short tours of duty on

vessels of the fleet. All the expenses in connection with these cruises and tours of duty are paid from the naval militia appropriations. Many naval militia officers have been able to take advantage of this opportunity to perform duty in the fleet and it is believed that great benefit has resulted to the naval militia and to the navy by this contact.

Both the navy and marine corps uniform regulations, governing the uniforms for the naval militia, both naval and marine corps branches, have been revised, and uniforms for the naval militia prescribed.

The Naval Militia Act authorizes the assignment of naval officers and enlisted men to duty as inspector-instructors of the naval militia. Officers have, during the past year, been assigned to 32 organizations or divisions, but in only two cases has this been independent duty, and not in addition to the officers' regular duties. A number of enlisted men have also been assigned, but to properly instruct the naval militia, many more inspector-instructors, both officers and enlisted men, are needed, and it is planned to assign officers and enlisted men to all organizations eventually.

A complete library of text-books has, during the year, been issued to all divisions and to inspector-instructors.

There has heretofore been no satisfactory accounting system in many of the organizations. One is now being established and standardized throughout the naval militia service.

During the spring of 1915, a limited number of petty officers from several organizations on the Atlantic coast were given two weeks instruction at the Marine Corps Rifle Range, Winthrop, Md.

A recruiting poster has been adopted and permission obtained to post this in buildings under the control of the Treasury Department, under the same restrictions imposed for army, navy and marine corps recruiting posters.

It has been decided to hold the examinations for naval militia officers at four different times prior to February 16, 1917, by which time all officers must have qualified. The first of these examinations has just been completed.

One aeronautic section has already been organized and steps are now being taken to organize several more. Several aeroplanes have been presented and it is hoped that an efficient aerial reserve will soon be built up as a part of the naval militia.

It is proposed to carry on the present program of instruction and training, and to endeavor to supply all organizations with outfits of clothing and equipment as far as the funds available will permit. The training will be devoted to general naval duties and to preparing the naval militia so that they may be used as an auxiliary for the navy in time of war, and may be qualified professionally and physically in accordance with the provisions of the Naval Militia Act.

Information concerning the naval militia can be obtained from the Division of Naval Militia Affairs, Navy Department, Washington, D. C.

FEDERAL ACTS RELATING TO THE ORGANIZED MILITIA IN GENERAL AND TO THE NAVAL MILITIA IN PARTICULAR

APPROPRIATIONS

Act	Date (Available July 1 of year specified)	Amount	Purpose
Naval (each year)	1891-1895, incl.	$ 25,000.00	Arming and Equipping Naval Militia
Naval "	1896-1898, "	50,000.00	"
Naval "	1899-1907, "	60,000.00	"
Naval "	1908-1909, "	100,000.00	"
Naval "	1909-1914, "	125,000.00	"
Naval "	1915 "	250,000.00	"

OTHER ACTS

Act	Date	Purpose
Special	August 3, 1894	Authorizes the loan of vessels for naval militia training and the assignment of navy enlisted men as shipkeepers. See 28 Stat., page 219.
Special	May 26, 1898	Authorizes the mustering in of the naval militia as a part of the auxiliary naval force for the Spanish-American War. See 30 Stat., page 744.
Special	June 3, 1902	Donating to the state of Alabama the lowermast of the U. S. S. *Don Juan de Austria* for flagstaff on state capitol grounds. See 32 Stat., page 304.
Special National Guard.	January 21, 1903	Formally organizing the militia of the United States and granting federal assistance. See 32 Stat., page 775.
Special National Guard.	May 27, 1908	Amends Section 1 of Militia Act of January 21, 1903. See 35 Stat., page 399.
Special	March 8, 1910	Modifies paragraphs 122 and 124, Articles of War, and to repeal paragraph 123, of Articles of War. Rank and precedence of officers of the army, marine corps, organized militia and volunteers. See 36 Stat., page 234.
Special Naval Militia.	February 16, 1914	To promote the efficiency of the naval militia and for other purposes. This act parallels the act of January 21, 1903, for the militia. It recognizes the naval militia and grants federal assistance. Supersedes the Act of August 3, 1894, regarding the loan of vessels for naval militia training, carries annual appropriation of $200,000.00. See 38 Stat., pages 283 to 290.
Special National Guard.	April 25, 1914	Provides for raising a volunteer force in time of actual or threatened war, affects the army, organized militia, and any volunteer forces decided upon. See 38 Stat., page 347.
Naval Act..	March 3, 1915	Establishes a naval reserve of men at present in the navy or who have at one time served in the navy. See 38 Stat., page 940. No connection with naval militia.

NAVY DEPARTMENT GENERAL ORDERS AFFECTING THE NAVAL MILITIA OF THE UNITED STATES

A. General Order No. 77, February 25, 1914—Publishes text of the Naval Militia Act of February 16, 1914, entitled "An Act to Promote the Efficiency of the Naval Militia and for Other Purposes."

B. General Order No. 93, April 12, 1914—Establishes the Division of Naval Militia Affairs, in the Navy Department, and outlines its duties.

C. General Order No. 150, June 14, 1915—Prescribes a standard physical examination for officers and enlisted men of the naval militia, in accordance with the Naval Militia Act.

D. General Order No. 153, July 10, 1915—Prescribes the qualifications required of naval militia personnel, including the organization, and professional requirements of the officers and enlisted men of the naval militia.

PUBLICATIONS ISSUED FOR THE GUIDANCE, INSTRUCTION AND INFORMATION OF THE NAVAL MILITIA SERVICE

A. Register of the Naval Militia of the United States.	Published annually by the Division of Naval Militia Affairs on January 1.
B. Annual Report of the Division of Naval Militia Affairs to the Secretary of the Navy.	
C. Report of Naval Militia Cruises.	Published annually by the Division of Naval Militia Affairs at the expiration of the summer cruises, giving extracts from the reports of naval officers on all naval militia cruises.
D. Tactical Signal Book for Naval Militia. (Confidential.)	A signal book issued to the naval militia for its guidance and instruction when falling in with or cruising with vessels of the navy or naval militia.
E. Gunnery Instructions for the Naval Militia, 1914. (Confidential.)	Rules and instructions for naval militia target practice.
F. Pamphlet No. 1, containing all Naval Militia Circular Letters in effect January 1, 1915.	A pamphlet of this nature is published semi-annually on January 1 and July 1, containing all naval militia circular letters in effect on these dates, which have not been previously published in printed pamphlet form.
G. Pamphlet No. 2, containing all Naval Militia Circular Letters in effect January 1, 1915 to June 30, 1915.	
H. Naval Militia Publication No. 6.	Prescribes a flag and pennant for use of naval militia vessels.
I. Naval Militia Accounting Instructions, with special reference to ships' equipment and stores.	Navy Department publication published for the guidance and instruction of the naval militia in accounting for government material.
J. Uniform Regulations, U. S. Navy, 1913. Chapter IX modified by changes in uniform regulations, U. S. Navy, 1913, No. 5.	Prescribes a uniform for the naval militia (naval branch).
K. Uniform Regulations, U. S. M. C., 1912. Changes in uniform regulations M. C. No. 1.	Chapter XIII prescribes a uniform for the naval militia (marine corps branch).

CURRENT NAVAL AND PROFESSIONAL PAPERS

NOTE.—Lack of space limits the scope of these references. Upon application, members of the Institute will be supplied with fuller references to current periodicals published in both the United States and foreign countries.

The subject matter is roughly indicated by the following paragraph index:

	PAR. NOS.
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TACTICS	3, 4, 5, 8, 24, 27
ENGINEERING	6, 7, 11, 12, 13, 16, 19, 20, 21, 22, 27
ORDNANCE	7, 14, 20, 25
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WAR ON LAND	3, 14, 15, 18, 23
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UNITED STATES.

1. CENTURY MAGAZINE. **November.**—The Swiss Military System, by *F. Feyler.* Are We a World Power? by *Arthur Bullard.*

2. ATLANTIC MONTHLY. **October.**—The British Admiralty, by *A. C. Gardiner.* The True Germany, by *Kuno Francke.*

3. REVIEW OF REVIEWS. **October.**—Weak Points in Our National Defences, by *J. Bernard Walker.* Bulgaria and the Balkan Crisis. Crucial War Situations of the Autumn, by *Frank H. Symonds.* **November.**—Lloyd George and Munitions, by *Lewis R. Freeman.* Military Training in Schools. Zeppelin Raids and Rights of Neutrals, by *Amos S. Hershey.*

4. WORLD'S WORK. **October.**—A Summary of the War at Sea. China's Fighting Blood Up, by *Willard Price.* Germany's Exit from South Africa. **November.**—The Navy and the Coming Congress. Weapons of the War, by *French Strother.*

5. NORTH AMERICAN REVIEW. **October.**—The Future of the Submarine, by *Franklin D. Roosevelt.* Military Preparedness: What Does it Mean? by *Major George B. Duncan.* Oil in the Caribbean and Elsewhere, by *Chester Lloyd Jones.* **November.**—If Germany ———? by *Monroe Smith.* Shall We Defend the Monroe Doctrine, by *A. B. Hart.* Naval Principles, by *Rear Admiral Bradley A. Fisk.*

6. SHIPPING ILLUSTRATED. **October 2.**—Electrical Equipment of a Battleship. **October 16.**—Bolinder Oil Engines.

7. SCIENTIFIC AMERICAN. **September 25.**—Signaling Apparatus Used by Airships. **October 9.**—Repairing the *Gulflight.* **October 23.**—Recent Advances in Wireless Measuring Instruments. Aerial Warfare and the Weather. Munitions Metals. The Rifle and its Bullet. Submarine Periscopes. **October 30.**—The Gun and the Aeroplane. Strategic Moves of the War, by *Lieutenant J. B. W. Gardiner.* The Trend of Electrical Development. Gunnery Aboard Ships. **November 6.**—Some Aids in Designing Machinery. Motor Trucks and Modern War.

8. SEVEN SEAS. **October.**—The Cruiser: Mysterious, Efficient, by *Commander Ralph Earle, U.S.N.*

9. FLYING. **November.**—The American Society of Aeronautic Engineers —The Naval Consulting Board of the United States. Sheepshead Bay Speedway to be Aviation Center of U. S. The Anti-Aeroplane Defence of Paris. The Defence of London Against Zeppelin Attack.

10. BULLETIN AMERICAN GEOGRAPHICAL SOCIETY. **September.**—The War and the World's Trade, by *A. L. Bishop*. The Slight Effect of the War in U. S. Commerce, by *Mark Jefferson*. **October.**—The Coal Resources of the World, by *Leon Dominian*.

11. INTERNATIONAL MARINE ENGINEERING. **October.**—Steamship Design (illustrated), by *H. A. Everett*. Placing Propeller on Vessel of over 11,000 Tons Displacement in Floating Drydock with Lifting Capacity of only 4500 Tons (illustrated). Calculations for Ships' Forms, by *Rear Admiral D. W. Taylor, U.S.N.* Design of Small Screw Propellers (illustrated). **November.**—Marine Oil Engines for Commercial Work (illustrated). Modern Submarines in War and Peace.—V, by *Simon Lake*. Letters from Marine Engineers: Some Defects in Installations of Marine Machinery and How They Were Remedied. The Failure of Evaporators. Improved Type of Marine Boiler (illustrated). Lubrication Troubles.

12. JOURNAL AMERICAN SOCIETY MECHANICAL ENGINEERS. **November.**—The Heavy Oil Engine, Its Present Status and Future Development.

13. ENGINEERING MAGAZINE. **November.**—For Peace and Prosperity with a Fighting Navy to Protect Them, by *John R. Dunlap*. The Part of the Civilian Engineer in Naval Preparedness, by *Frank J. Sprague*. Ships and a Navy for the Americas, by *William L. Saunders*. Our Naval Development as Related to National Defence, by *Rear Admiral John R. Edwards*. How the Navy Department is Organized. Personnel of the Naval Consulting Board.

14. INFANTRY JOURNAL. **November.**—Infantry Fire in the Present War, by *General Cherfils, French Army*. The Citizen Soldier, by *Major I. L. Hunt*. The Battle Sight, by *Captain George Chase Lewis*. The Stiff Bayonet, by *Second Lieutenant C. M. Sawyer*. The Seizure of Vera Cruz, by *César Reyes Aguirre*.

15. JOURNAL MILITARY SERVICE INSTITUTION. **November-December.**—The National Defence: A Solution, by *Major Parker*. The Mobilization and Supply of Army Material, by *Martin J. Gillen*. Translations: The Coming War. The German Army after its Reorganization. The Serbian Campaign (maps). Reprints: The First U. S. Flag. The Telegraph and Telephone in the Germany Army. Selling Arms and Ammunition. The Navy and the War. Inactivity of the German Navy. The Swiss Military System.

GREAT BRITAIN

16. THE NINETEENTH CENTURY AND AFTER. **October.**—The "Ligeance of the King": A Study of Nationality and Naturalization, by *Sir Francis Piggott*. The Third War Budget, by *H. J. Jennings*. More Leaves from a Field Note-Book, by *Professor J. H. Morgan*. The National Register and After, by *Sir Clement Kinloch-Cooke*. Compulsory Service as a Principle of the Constitution, by *Sir Henry Blake*. Resolute Russia, by *Robert Machray*. The Pope and the German Atrocities, by *Canon Moyes*. The Pope, Orthodoxy, and the Allies, by *R. B. C. Sheridan*. Our Unseen Enemies and Allies, by *A. P. Sinnett*. The Concert of Europe: A Plain Moral for To-day, by *J. A. R. Marriott*. Military Aspects of a Frontier, by *Sir Thomas Holdich*. Mr. Lloyd George and the War, by *Sydney Brooks*.

17. THE FORTNIGHTLY REVIEW. **October.**—Scientific and Engineering Aspects of the War, by *John B. C. Kershaw.* The "German God," by *A. W. G. Randall.* German Logic and its Results, by *A. E. P. B. Weigall.* Our Panic-built Navy—Before and After the War, by *Archibald Hurd.* Submarines *versus* Surface Craft for Future Navies, by *W. O. Horsnaill.* Italy in the Clutches of Germany, by *Ezio Gray.* Our Colonies and the War, by the *Rev. William Greswell.* A German Fog in Washington, by *James Davenport Whelpley.* The New Diplomacy and the Old Tradition, by *T. H. S. Escott.* The War and Social Revolution, by *Philip Whitwell Wilson.* History of the War (maps).

18. THE CONTEMPORARY REVIEW. **October.**—The General Situation in Russia, by *F. N. Maude.* Restriction of Output, by *Theodore Cooke Taylor.* Riga and its Surroundings, by *Edward Harper Parker.* Home Problems After the War, by *B. Seebohm Rowntree.* India's Services in the War, by *A. Yusuf Ali.* The Imitation of Napoleon I by the Germans, by *J. Holland Rose.* The Resurrection of Poland, by *J. H. Harley.* Germany and South Africa, by *R. C. Hawkin.* Neutrals and Belgian Neutrality, by *Ch. De Visscher, Professor of Law, University of Ghent.*

19. ENGINEERING. **October 8.**—Engineering Societies and the War. Skilled Labor and the War. Historical Steam Engines.

20. THE ENGINEER. **September 17.**—Negative Slip of Propellers. Zeppelin and Aeroplane Raids. Cellulose for Explosives. The Consumption of Shells. **October 8.**—Science in the War and After the War. Machinery for the Production of Projectiles, No VII (illustrated). High-speed Steels.

21. THE MARINE ENGINEER AND NAVAL ARCHITECT. **October.**—Editorial Notes: Science in War and After. The Loss of the S. S. *Arabic.* The Prize Court and Prize Money (illustrated). **November.**—Bulkheads and Watertight Compartments. Steam Turbine Blading Alloys. The Application of the Steam Turbine to Marine Propulsion (illustrated). Detection of Internal Blowholes in Metal Castings.

22. PAGE'S ENGINEERING WEEKLY. **October 8.**—Compressed Air for Floating Stranded Ships.

23. UNITED SERVICE MAGAZINE. **October.**—The Navy and the War, by *"Admiral."* War Notes, by *Captain H. M. Johnstone.* A Naval Essay, 1914. Some Aspects of the Empire in War, *Lieutenant Colonel A. C. Yate.* Wanted! An Atlas of Naval and Military Exploits, by *"Shear-Hulk."* Progress in Aeronautics, by *Major H. Bannerman-Phillips.*

CONTINENTAL EUROPE AND SOUTH AMERICA

24. REVISTA GENERALE DE MARINA (Madrid). **August.**—Longitudinal Stability in Submarines. Sanitary Regulation in the Present War. **September.**—The Battle of Trafalgar (official documents, continued). Submarines. New Methods of Attack in the Present War.

25. RIVISTA MARITTIMA (Rome). **September.**—Official Communications and Despatches. Changes in Plans for the Construction and Arrangement of Guns.

26. REVISTA MARITIMA BRAZILEIRA. **May.**—Naval Organization.

27. REVISTA DE MARINA (Valparaiso). **August.**—Points on Navigation, by *"Delta."* Naval Politics. Protection of Hulls Against Submarines.

BRINGING IN THE WOUNDED "LION," BY W. L. WYLLIE, R. A. (done from a photograph)

EUROPEAN WAR NOTES

Compiled by LIEUTENANT C. C. GILL, U. S. Navy *

GENERAL ARRANGEMENT

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(Details of Land Operations are not included)

[Events of international significance will be briefly chronicled in large type. Notes and comments bearing upon these events will be interspersed in smaller type. Addenda will be published in future issues to correct and complete this compilation.]

DIPLOMATIC NOTES

GREAT BRITAIN

In response to a request (**June 4**) from the American Ambassador for figures regarding British exports of cocoa to neutral European countries, Sir Edward Grey presented on **August 13** a detailed statement of British exports, designed to show that blockade restrictions were not employed "to stop the legitimate trade of the United States with European countries in order to capture trade for the British Empire." The figures quoted are in part shown in the following tables:

EXPORTS TO NORWAY, SWEDEN, DENMARK AND HOLLAND

VARIATIONS, JANUARY-MAY, 1915, AS COMPARED WITH JANUARY-MAY, 1914

		Great Britain	United States
Cotton	centals	+503,995	+3,149,461
Rubber	centals	—1,034	+3,461
Lubricating oils	gallons	+703,370	+3,857,593
Tobacco	pounds	+2,937,244	+6,081,848

* Acknowledgment is made to A. F. Westcott, Ph. D., Instructor U. S. Naval Academy, for help given in making this compilation.

LEARNING IN THE WOUNDED LION," BY W. L. WYLLIE, R. A. (done from a photograph)

DECLINE IN BRITISH EXPORTS

		1915 (Five Months)	1914 (Five Months)
Tallow, unrefined	cwt.	190,179	378,926
Quicksilver	lbs.	258,075	784,650
Machinery—			
Agricultural	tons	163	8,396
Sewing machines	no.	853	6,683
Cotton waste	lbs.	205,960	469,235
Carpet and carpet rugs	sq. yds.	58,161	184,105
Silk, thrown	lbs.	656	15,582
Beef, chilled	cwt.	3,262	274,151
Meat, preserved	cwt.	19,531	61,000
Butter	cwt.	19,253	66,343
Bananas	bunches	127,217	258,315
Hemp	tons	19,399	25,673
Palm oil	cwt.	177,529	382,513
Gas oil	gallons	9,800	241,724
Fuel oil	gallons	169,884	515,170

TABLE SHOWING VALUE OF UNITED STATES EXPORTS

To	In January-May, 1914	In January-May, 1915	Increase in 1915 over 1914
Norway	$3,679,000	$22,478,000	$18,799,000
Sweden	3,875,000	52,217,000	46,342,000
Denmark	6,421,000	41,321,000	34,900,000
Netherlands	44,114,000	89,731,000	45,617,000
Total	$60,089,000	$205,747,000	$145,658,000

—*London Times*, 2/10.

On **October 21**, the United States despatched a further protest against British restrictions on American commerce. The note, which is of particular significance in its interpretation of the principles of international law bearing on the exercise of naval power in restraint of neutral trade, is divided under three heads, as follows: (1) regarding *detention of American vessels*, that the British practice of detaining such vessels on mere conjectural suspicion and holding them while awaiting further evidence is unwarranted, that immediate search at sea is not impracticable, and that there should be free passage of cotton, rubber and other goods to neutral countries which have prohibited their re-export; (2) regarding the *so-called British "blockade measures,"* that they are "ineffective, illegal, and indefensible," since they notoriously fail to prevent Scandinavian trade with Germany, and since there is no sanction in international law for the blockade of neutral ports; (3) regarding *British prize courts*, that there is injustice in the requirement that American claims must be settled in these courts rather than through diplomatic channels, since these courts must

regard British Orders in Council as taking precedence over international law, and since the delays and restrictions of prize court procedure involve additional expense and injury to American trade for which no redress is provided. The text of the note follows:

THE SECRETARY OF STATE TO AMBASSADOR W. H. PAGE

DEPARTMENT OF STATE

WASHINGTON, October 21, 1915.

SIR: I desire that you present a note to Sir Edward Grey in the sense of the following:

(1) The government of the United States has given careful consideration to Your Excellency's notes of January 7, February 10, June 22, July 23, July 31 (2), August 13, and to a note verbale of the British Embassy of August 6, relating to restrictions upon American commerce by certain measures adopted by the British Government during the present war. This government has delayed answering the earlier of these notes in the hope that the announced purpose of His Majesty's Government "to exercise their belligerent rights with every possible consideration for the interest of neutrals" and their intention of "removing all causes of avoidable delay in dealing with American cargoes" and of causing "the least possible amount of inconvenience to persons engaged in legitimate trade," as well as their "assurances to the United States Government that they would make it their first aim to minimize the inconveniences" resulting from the "measures taken by the Allied Governments," would in practice not unjustifiably infringe upon the neutral rights of American citizens engaged in trade and commerce. It is, therefore, a matter of regret that this hope has not been realized, but, that, on the contrary, interferences with American ships and cargoes destined in good faith to neutral ports and lawfully entitled to proceed have become increasingly vexatious, causing American shipowners and American merchants to complain to this government of the failure to take steps to prevent an exercise of belligerent power in contravention of their just rights. As the measures complained of proceed directly from orders issued by the British Government, are executed by British authorities, and arouse a reasonable apprehension that, if not resisted, they may be carried to an extent even more injurious to American interests, this government directs the attention of His Majesty's Government to the following considerations:

(2) Without commenting upon the statistics presented by His Majesty's Government to show that the export trade of the United States has increased in volume since the war began further than to point out that the comparative values fail to take into account the increased price of commodities resulting from a state of war or to make any allowance for the diminution in the volume of trade which the neutral countries in Europe previously had with the nations at war, a diminution which compelled them to buy in other markets, I will pass directly to the matters which constitute the specific complaints to this government.

Detention of Vessels.—(3) *First.*—The detention of American vessels and cargoes which have taken place since the opening of hostilities have, it is presumed, been pursuant to the enforcement of the Orders in Council, which were issued on August 20 and October 29, 1914, and March 11, 1915, and relate to contraband traffic and to the interception of trade to and from Germany and Austria-Hungary. In practice these detentions have not been uniformly based on proofs obtained at the time of seizure, but many vessels have been detained while search was made for evidence of the contraband character of cargoes or of an intention to evade the nonintercourse measures of Great Britain. The question, consequently has been one of evidence to support a belief of—in many cases a bare suspicion of—enemy

destination, or occasionally of enemy origin of the goods involved. Whether this evidence should be obtained by search at sea before the vessel or cargo is taken into port, and what the character of the evidence should be, which is necessary to justify the detention, are the points to which I direct Your Excellency's attention.

(4) In regard to search at sea, an examination of the instructions issued to naval commanders of the United States, Great Britain, Russia, Japan, Spain, Germany, and France from 1888 to the beginning of the present war shows that search in port was not contemplated by the government of any of these countries. On the contrary, the context of the respective instructions shows that search at sea was the procedure expected to be followed by the commanders. All of these instructions impress upon the naval officers the necessity of acting with the utmost moderation—and in some cases commanders are specifically instructed—in exercising the right of visit and search to avoid undue deviation of the vessel from her course.

(5) An examination of the opinions of the most eminent text writers on the laws of nations shows that they give practically no consideration to the question of search in port, outside of examination in the course of regular prize court proceedings.

(6) The assertion by His Majesty's Government that the position of the United States in relation to search at sea is inconsistent with its practice during the American Civil War is based upon a misconception. Irregularities there may have been at the beginning of that war, but a careful search of the records of this government as to the practice of its commanders shows conclusively that there were no instances when vessels were brought into port for search prior to instituting prize court proceedings, or that captures were made upon other grounds than, in the words of the American note of November 7, 1914, "evidence found on the ship under investigation and not upon circumstances ascertained from external sources." A copy of the instruction issued to American naval officers on August 18, 1862, for their guidance during the Civil War is appended.

(7) The British contention that "modern conditions" justify bringing vessels into port for search is based upon the size and seaworthiness of modern carriers of commerce and the difficulty of uncovering the real transaction in the intricate trade operations of the present day. It is believed that commercial transactions of the present time, hampered as they are by censorship of telegraph and postal communication on the part of belligerents, are essentially no more complex and disguised than in the wars of recent years, during which the practice of obtaining evidence in port to determine whether a vessel should be held for prize proceedings was not adopted. The effect of the size and seaworthiness of merchant vessels upon their search at sea has been submitted to a board of naval experts, which reports that—

"At no period in history has it been considered necessary to remove every package of a ship's cargo to establish the character and nature of her trade or the service on which she is bound, nor is such removal necessary.

. . . .

"The facilities for boarding and inspection of modern ships are in fact greater than in former times, and no difference, so far as the necessities of the case are concerned, can be seen between the search of a ship of a thousand tons and one of twenty thousand tons—except possibly a difference in time—for the purpose of establishing fully the character of her cargo and the nature of her service and destination. . . . . This method would be a direct aid to the belligerents concerned in that it would release a belligerent vessel overhauling the neutral from its duty of search and set it free for further belligerent operations."

(8) Turning to the character and sufficiency of the evidence of the contraband nature of shipments to warrant the detention of a suspected vessel or cargo for prize proceedings, it will be recalled that when a vessel

is brought in for adjudication courts of prize have heretofore been bound by well-established and long-settled practice to consider at the first hearing only the ship's papers and documents, and the goods found on board, together with the written replies of the officers and seamen to standing interrogatories taken under oath alone and separately, as soon as possible and without communication with or instruction by counsel, in order to avoid possibility of corruption and fraud.

(9) Additional evidence was not allowed to be introduced except upon an order of the court for "further proof," and then only after the cause had been fully heard upon the facts already in evidence or when this evidence furnished a ground for prosecuting the inquiry further. This was the practice of the United States courts during the War of 1812, the American Civil War, and the Spanish-American War, as is evidenced by the reported decisions of those courts, and has been the practice of the British prize courts for over a century. This practice has been changed by the British prize court rules adopted for the present war by the Order in Council of August 5. Under these new rules there is no longer a "first hearing" on the evidence derived from the ship, and the prize court is no longer precluded from receiving extrinsic evidence for which a suggestion has not been laid in the preparatory evidence. The result is, as pointed out above, that innocent vessels or cargoes are now seized and detained on mere suspicion while efforts are made to obtain evidence from extraneous sources to justify the detention and the commencement of prize proceedings. The effect of this new procedure is to subject traders to risk of loss, delay, and expense so great and so burdensome as practically to destroy much of the export trade of the United States to neutral countries of Europe.

(10) In order to place the responsibility for the delays of vessels and cargoes upon American claimants, the Order in Council of October 29, 1914, as pointed out in the British note of February 10, seeks to place the burden of proof as to the noncontraband character of the goods upon the claimant in cases where the goods are consigned "to order" or the consignee is not named or the consignee is within enemy territory. Without admitting that the *onus probandi* can rightfully be made to rest upon the claimant in these cases, it is sufficient for the purposes of this note to point out that the three classes of cases indicated in the Order in Council of October 29 apply to only a few of the many seizures or detentions which have actually been made by British authorities.

(11) The British contention that in the American Civil War the captor was allowed to establish enemy destination by "all the evidence at his disposal," citing the *Bermuda* case (3 Wallace, 515), is not borne out by the facts of that case. The case of the *Bermuda* was one of "further proof," a proceeding not to determine whether the vessel should be detained and placed in a prize court, but whether the vessel having been placed in prize court, should be restored or condemned. The same ruling was made in the case of the *Sir William Peel* (5 Wallace, 517). These cases, therefore, cannot be properly cited as supporting the course of a British captor in taking a vessel into port, there to obtain extrinsic evidence to justify him in detaining the vessel for prize proceedings.

(12) The further contention that the greatly increased imports of neutral countries, adjoining Great Britain's enemies, raise a presumption that certain commodities, such as cotton, rubber, and others more or less useful for military purposes, though destined for those countries, are intended for re-exportation to the belligerents who cannot import them directly, and that this fact justifies the detention for the purpose of examination of all vessels bound for the ports of those neutral countries, notwithstanding the fact that most of the articles of trade have been placed on the embargo lists of those countries, cannot be accepted as laying down a just or legal rule of evidence. Such a presumption is too remote from the facts and offers too great opportunity for abuse by the belligerent, who could, if the rule were adopted, entirely ignore neutral rights on the

high seas and prey with impunity upon neutral commerce. To such a rule of legal presumption this government cannot accede, as it is opposed to those fundamental principles of justice which are the foundation of the jurisprudence of the United States and Great Britain.

(13) Before passing from the discussion of this contention as to the presumption raised by increased importations to neutral countries, this government directs attention to the fact that His Majesty's Government admit that the British exports to those countries have also materially increased since the present war began. Thus Great Britain concededly shares in creating a condition which is relied upon as a sufficient ground to justify the interception of American goods destined to neutral European ports. If British exports to those ports should be still further increased, it is obvious that, under the rule of evidence contended for by the British Government, the presumption of enemy destination could be applied to a greater number of American cargoes, and American trade would suffer to the extent that British trade benefited by the increase. Great Britain cannot expect the United States to submit to such manifest injustice or to permit the rights of its citizens to be so seriously impaired.

(14) When goods are clearly intended to become incorporated in the mass of merchandise for sale in a neutral country it is an unwarranted and inquisitorial proceeding to detain shipments for examination as to whether those goods are ultimately destined for the enemy's country or use. Whatever may be the conjectural conclusions to be drawn from trade statistics, which, when stated by value, are of uncertain evidence as to quantity, the United States maintains the right to sell goods into the general stock of a neutral country and denounces as illegal and unjustifiable any attempt of a belligerent to interfere with that right, on the ground that it suspects that the previous supply of such goods in the neutral country, which the imports renew or replace, has been sold to an enemy. That is a matter with which the neutral vendor has no concern and which can in no way affect his rights of trade. Moreover, even if goods listed as conditional contraband are destined to an enemy country through a neutral country, that fact is not in itself sufficient to justify their seizure.

(15) In view of these considerations the United States, reiterating its position in this matter, has no other course but to contest seizures of vessels at sea upon conjectural suspicion and the practice of bringing them into port for the purpose, by search or otherwise, of obtaining evidence, for the purpose of justifying prize proceedings, of the carriage of contraband or of the breaches of the Order in Council of March 11. Relying upon the regard of the British Government for the principles of justice so frequently and uniformly manifested prior to the present war, this government anticipates that the British Government will instruct their officers to refrain from these vexatious and illegal practices.

Not a Real Blockade.—(16) *Second.*—The government of the United States further desires to direct particular attention to the so-called "blockade" measures imposed by the Order in Council of March 11. The British note of July 23, 1915, appears to confirm the intention indicated in the note of March 15, 1915, to establish a blockade so extensive as to prohibit trade with Germany or Austria-Hungary, even through the ports of neutral countries adjacent to them. Great Britain, however, admits that it should not, and gives assurances that it will not, interfere with trade with the countries contiguous to the territories of the enemies of Great Britain. Nevertheless, after over six months application of the "blockade" order, the experience of American citizens has convinced the government of the United States that Great Britain has been unsuccessful in her efforts to distinguish between enemy and neutral trade. Arrangements have been made to create in these neutral countries special consignees, or consignment corporations, with power to refuse shipments and to determine when the state of the country's resources requires the importation of new commodities. American commercial interests are hampered by the intrica-

cies of these arrangements, and many American citizens justly complain that their *bona fide* trade with neutral countries is greatly reduced as a consequence, while others assert that their neutral trade, which amounted annually to a large sum, has been entirely interrupted.

(17) It makes this practice even more harassing to neutral traders that the British authorities require a consignor to prove that his shipments are not bound to an enemy of Great Britain, even when the articles are on the embargo list of the neutral country to which they are destined, and that notwithstanding the assertion in the last British note that interference with such trade by a belligerent can only take place "provided, of course, that he (the belligerent) can establish" that the commerce is with the enemy.

(18) While the United States Government was at first inclined to view with leniency the British measures which were termed in the correspondence, but not in the Order in Council of March 11 a "blockade," because of the assurances of the British Government that inconvenience to neutral trade would be minimized by the discretion left to the courts in the application of the Order in Council and by the instructions which it was said would be issued to the administrative and other authorities having to do with the execution of the so-called "blockade" measures, this government is now forced to the realization that its expectations, which were fully set forth in its note of March 30, were based on a misconception of the intentions of the British Government. Desiring to avoid controversy and in the expectation that the administration of the Order in Council would conform to the established rules of international law, this government has until now reserved the question of the actual validity of the Order in Council of March 11, in so far as it is considered by the government of Great Britain to establish a blockade within the meaning of that term as understood in the law and the practice of nations; but in the circumstances now developed it feels that it can no longer permit the validity of the alleged blockade to remain unchallenged.

(19) The Declaration of Paris in 1856, which has been universally recognized as correctly stating the rule of international law as to blockade, expressly declares that "blockades, in order to be binding, must be effective; that is to say, maintained by force sufficient really to prevent access to the coast of the enemy." The effectiveness of a blockade is manifestly a question of fact. It is common knowledge that the German coasts are open to trade with the Scandinavian countries and that German naval vessels cruise both in the North Sea and the Baltic and seize and bring into German ports neutral vessels bound for Scandinavian and Danish ports. Furthermore, from the recent placing of cotton on the British list of contraband of war, it appears that the British Government have themselves been forced to the conclusion that the blockade is ineffective to prevent shipments of cotton from reaching their enemies, or else that they are doubtful as to the legality of the form of blockade which they have sought to maintain.

(20) Moreover, it is an essential principle which has been universally accepted that a blockade must apply impartially to the ships of all nations. This was set forth in the Declaration of London, is found in the prize rules of Germany, France, and Japan, and has long been admitted as a basic principle of the law of blockade. This principle, however, is not applied in the present British "blockade," for, as above indicated, German ports are notoriously open to traffic with the ports of Denmark, Norway, and Sweden. So strictly has this principle been enforced in the past that in the Crimean War the Judicial Committee of the Privy Council on appeal laid down, that if belligerents themselves trade with blockaded ports they cannot be regarded as effectively blockaded. (*The Franciska*, Moore P. C., 56.) This decision has special significance at the present time, since it is a matter of common knowledge that Great Britain exports and re-exports large quantities of merchandise to Norway, Sweden, Den-

mark, and Holland, whose ports, so far as American commerce is concerned, she regards as blockaded. In fact, the British note of August 13 itself indicates that the British exports of many articles, such as cotton, lubricating oil, tobacco, cocoa, coffee, rice, wheat flour, barley, spices, tea, copra, etc., to these countries have greatly exceeded the British exports of the same articles for the corresponding period of 1914. The note also shows that there has been an important British trade with these countries in many other articles such as machinery, beef, butter, cotton waste, etc.

(21) Finally, there is no better settled principle of the law of nations than that which forbids the blockade of neutral ports in time of war. The Declaration of London, though not regarded as binding upon the signatories because not ratified by them, has been expressly adopted by the British Government without modification as to blockade in the British Order in Council of October 29, 1914. Article 18 of the Declaration declares specifically that "The blockading forces must not bar access to neutral ports or coasts." This is, in the opinion of this government, a correct statement of the universally accepted law as it exists to-day and as it existed prior to the Declaration of London. The meaning of this statement is elucidated by Mr. Renault in the report of the drafting committee upon the convention, in which he states:

"This rule has been thought necessary the better to protect the commercial interests of neutral countries; it completes Article 1, according to which a blockade must not extend beyond the ports and coasts of the enemy which implies that, as it is an operation of war, it must not be directed against a neutral port, *in spite of the importance to a belligerent of the part played by that port in supplying his adversary.*

"As the conference assembled at London upon the invitation of the British Government, it is important to recall the instruction of Sir Edward Grey to the British delegates, 'setting out the views of His Majesty's Government, founded on the decisions of the British courts,' in which he says:

"A blockade must be confined to the ports and coast of the enemy, but it may be instituted of one port or of several ports or of the whole of the seaboard of the enemy. It may be instituted to prevent the ingress only or egress only, or both."

He added:

"Where the ship does not intend to proceed to the blockaded port, the fact that goods on board are to be sent on by sea or by inland transport is no ground for condemnation."

In support of this announcement, Sir Edward Grey referred to several decisions of British prize courts, among which an early one of 1801 held that goods shipped from London to Emden, thence inland or by canal to Amsterdam, then blockaded by sea, were not subject to condemnation for breach of blockade. (*Jonge Pieter*, 4 C. R., 79.) This has been the rule for a century, so that it is scarcely necessary to recall that the Matamoras cases, well known to the British Government, support the same rule, that neutral ports may not be blockaded, though "trade with unrestricted inland commerce between such a port and the enemy's territory impairs undoubtedly, and very seriously impairs, the value of a blockade of the enemy's coast."

(22) Without mentioning the other customary elements of a regularly imposed blockade, such as notification of the particular coast line invested, the imposition of the penalty of confiscation, etc., which are lacking in the present British "blockade" policy, it need only be pointed out that, measured by the three universally conceded tests above set forth, the present British measures cannot be regarded as constituting a blockade in law, in practice, or in effect.

(23) It is incumbent upon the United States Government, therefore, to give the British Government notice that the blockade, which they claim

to have instituted under the Order in Council of March 11, cannot be recognized as a legal blockade by the United States.

(24) Since the Government of Great Britain has laid much emphasis on the ruling of the Supreme Court of the United States in the *Springbok* case, that goods of contraband character seized while going to the neutral port of Nassau, though actually bound for the blockaded ports of the south, were subject to condemnation, it is not inappropriate to direct attention to the British view of this case in England prior to the present war, as expressed by Sir Edward Grey in his instructions to the British delegates to the London Conference in 1908:

"It is exceedingly doubtful whether the decision of the Supreme Court was in reality meant to cover a case of blockade-running in which no question of contraband arose. Certainly if such was the intention, the decision would *pro tanto* be in conflict with the practice of the British courts. His Majesty's Government sees no reason for departing from that practice, and you should endeavor to obtain general recognition of its correctness."

It may be pointed out also that the circumstances surrounding the *Springbok* case were essentially different from those of the present day to which the rule laid down in that case is sought to be applied. When the *Springbok* case arose the ports of the Confederate States were effectively blockaded by the naval forces of the United States, though no neutral ports were closed, and a continuous voyage through a neutral port required an all-sea voyage terminating in an attempt to pass the blockading squadron.

British Prize Courts.—(24) *Third.* It appears to be the position of Great Britain that if, as the United States alleges, American citizens or American interests are directly and adversely affected by the British policies of contraband and nonintercourse, resulting in interference with ships and cargoes, they should seek redress in the prize courts which the British Government have established, and that, pending the exhaustion of such legal remedies with the result of a denial of justice, the British Government "cannot continue to deal through the diplomatic channels with the individual cases."

(26) It is declared that this was the course followed by the United States during the American Civil War and the Spanish War, and that both countries have supported the practice by allowing their prize court decisions, when shown to be unjust or inadequate, to be reviewed by an international tribunal, as was done under the treaties of 1794 and 1871. The ground upon which this contention is put forth, and the results which would follow, if the course of procedure suggested were accepted, give the impression that His Majesty's Government do not rely upon its soundness or strength. Nevertheless, since it has been advanced, I cannot refrain from presenting certain considerations which will show that the proposed course embodies the form rather than the substance of redress. The cases which the British Government would have claimants present to their prize courts are essentially different from cases arising wholly within the jurisdiction of a foreign country. They result from acts committed by the British naval authorities upon the high seas, where the jurisdiction over neutral vessels is acquired solely by international law. Vessels of foreign nationality, flying a neutral flag and finding their protection in the country of that flag, are seized without facts warranting a reasonable suspicion that they are destined to blockaded ports of the enemy or that their cargoes are contraband, although the possession of such facts is, by international law, essential to render a seizure legal. The officers appear to find their justification in the Orders in Council and regulations of the British Government, in spite of the fact that in many of the present cases the Orders in Council and the regulations for their enforcement are themselves complained of by claimants as contrary to international law. Yet the very courts which, it is said, are to dispense justice to dissatisfied claim-

ants, are bound by the Orders in Council. This is unmistakably indicated to be the case in the British note of July 31, which states that:

"British prize courts 'according to the ancient form of commission under which they sit are to determine cases, according to the course of admiralty and the law of nations and the statutes, rules, and regulations for the time being in force in that behalf.'"

This principle, the note adds, has recently been announced and adhered to by the British prize court in the case of the *Zamora*. It is manifest therefore, that if prize courts are bound by the laws and regulations under which seizures and detentions are made, and which claimants allege are in contravention of the law of nations, those courts are powerless to pass upon the real ground of complaint or to give redress for wrongs of this nature. Nevertheless, it is seriously suggested that claimants are free to request the prize court to rule upon a claim of conflict between an Order in Council and a rule of international law. How can a tribunal fettered in its jurisdiction and procedure by municipal enactments declare itself emancipated from their restrictions and at liberty to apply the rules of international law with freedom? The very laws and regulations which bind the court are now matters of dispute between the government of the United States and that of His Britannic Majesty. If Great Britain followed, as she declares that she did, the course of first referring claimants to local remedies in cases arising out of American wars, it is presumed that she did so because of her knowledge or understanding that the United States had not sought to limit the jurisdiction of its courts of prize by instructions and regulations violative of the law and practice of nations, or open to such objection.

(27) The British note of February 10 states that the British Government in the American Civil War:

"in spite of remonstrances from many quarters, placed full reliance on the American prize courts to grant redress to the parties interested in cases of alleged wrongful capture by American ships of war and put forward no claim until the opportunity for redress in those courts had been exhausted."

The government of the United States recalls that during the progress of that war Great Britain, in several instances, demanded through diplomatic channels damages for seizures and detentions of British ships alleged to have been made without legal justification. Among these may be mentioned the cases of the *Magicienne*, the *Don Jose*, the *Labuan*, and the *Saxon*. Two of these cases were, at the time the demands were made, before American prize courts for adjudication. It is understood also that during the Boer War, when British authorities seized the German vessels, the *Hertzog*, *The General*, and *The Bundesrath*, and released them without prize proceedings, compensation for damages suffered was arranged through diplomatic channels.

(28) There is, furthermore, a real and far-reaching injury for which prize courts offer no means of reparation. It is the disastrous effect of the methods of the allied governments upon the general right of the United States to enjoy its international trade free from unusual and arbitrary limitations imposed by belligerent nations. Unwarranted delay and expense in bringing vessels into port for search and investigation upon mere suspicion has a deterrent effect upon trade ventures, however lawful they may be, which cannot be adequately measured in damages. The menace of interference with legal commerce causes vessels to be withdrawn from their usual trade routes and insurance on vessels and cargoes to be refused, while exporters for the same reason are unable or unwilling to send their goods to foreign markets and importers dare not buy commodities abroad because of fear of their illegal seizure or because they are unable to procure transportation. For such injuries there can be no remedy through the medium of courts established to adjust claims for

goods detained or condemned. For specific injuries suffered by private interests prize courts, if they are free to apply the law of nations, might mete out an adequate indemnity, but for the injury to the trade of a nation by the menace of unwarranted interference with its lawful and established pursuit there can manifestly be found no remedy in the prize courts of Great Britain, to which United States' citizens are referred for redress.

(29) There is another ground why American citizens cannot submit their wrongs arising out of undue detentions and seizures to British prize courts for reparation which I cannot pass over unnoticed. It is the manner in which British courts obtain jurisdiction of such cases. The jurisdiction over merchant vessels on the high seas is that of the nation whose flag it rightfully flies. This is a principle of the law and practice of nations fundamental to the freedom of the high seas. Municipal enactments of a belligerent power cannot confer jurisdiction over or establish rules of evidence governing the legality of seizures of vessels of neutral nationality on the high seas. International law alone controls the exercise of the belligerent right to seize and detain such vessels. Municipal laws and regulations in violation of the international rights of another nation, cannot be extended to the vessels of the latter on the high seas so as to justify a belligerent nation bringing them into its ports, and, having illegally brought them within its territorial jurisdiction, compelling them to submit to the domestic laws and regulations of that nation. Jurisdiction obtained in such a manner is contrary to those principles of justice and equity which all nations should respect. Such practice should invalidate any disposition by a municipal court of property thus brought before it. The government of the United States has, therefore, viewed with surprise and concern the attempt of His Majesty's Government to confer upon the British prize courts jurisdiction by this illegal exercise of force in order that these courts may apply to vessels and cargoes of neutral nationalities seized on the high seas, municipal laws and orders which can only rightfully be enforceable within the territorial waters of Great Britain, or against vessels of British nationality when on the high seas.

(30) In these circumstances the United States Government feels that it cannot reasonably be expected to advise its citizens to seek redress before tribunals which are, in its opinion, unauthorized by the unrestricted application of international law to grant reparation, nor to refrain from presenting their claims directly to the British Government through diplomatic channels.

(31) This government is advised that vessels and cargoes brought in for examination prior to prize proceedings are released only upon condition that costs and expenses incurred in the course of such unwarranted procedure, such as pilotage, wharfage, demurrage, harbor dues, warehouseage, unlading costs, etc., be paid by the claimants or on condition that they sign a waiver of right to bring subsequent claims against the British Government for these exactions. This government is loath to believe that such ungenerous treatment will continue to be accorded American citizens by the government of His Britannic Majesty, but in order that the position of the United States Government may be clearly understood, I take this opportunity to inform Your Excellency that this government denies that the charges incident to such detentions are rightfully imposed upon innocent trade or that any waiver of indemnity exacted from American citizens under such conditions of duress can preclude them from obtaining redress through diplomatic channels or by whatever other means may be open to them.

(32) Before closing this note, in which frequent reference is made to contraband traffic and contraband articles, it is necessary, in order to avoid possible misconstruction, that it should be clearly understood by His Majesty's Government that there is no intention in this discussion to commit the government of the United States to a policy of waiving any

objections which it may entertain as to the propriety and right of the British Government to include in their list of contraband of war certain articles which have been so included. The United States Government reserves the right to make this matter the subject of a communication to His Majesty's Government at a later day.

Champion of Neutral Rights.—(33) I believe it has been conclusively shown that the methods sought to be employed by Great Britain to obtain and use evidence of enemy destination of cargoes bound for neutral ports and to impose a contraband character upon such cargoes are without justification; that the blockade, upon which such methods are partly founded, is ineffective, illegal, and indefensible: that the judicial procedure offered as a means of reparation for an international injury is inherently defective for the purpose; and that in many cases jurisdiction is asserted in violation of the law of nations. The United States, therefore, cannot submit to the curtailment of its neutral rights by these measures, which are admittedly retaliatory, and therefore illegal, in conception and in nature, and intended to punish the enemies of Great Britain for alleged illegalities on their part. The United States might not be in a position to object to them if its interests and the interests of all neutrals were unaffected by them, but, being affected, it cannot with complacence suffer further subordination of its rights and interests to the plea that the exceptional geographic position of the enemies of Great Britain require or justify oppressive and illegal practices.

(34) The government of the United States desires, therefore, to impress most earnestly upon His Majesty's Government that it must insist that the relations between it and His Majesty's Government be governed, not by a policy of expediency, but by those established rules of international conduct upon which Great Britain in the past has held the United States to account when the latter nation was a belligerent engaged in a struggle for national existence. It is of the highest importance to neutrals not only of the present day but of the future that the principles of international right be maintained unimpaired.

(35) This task of championing the integrity of neutral rights, which have received the sanction of the civilized world against the lawless conduct of belligerents arising out of the bitterness of the great conflict which is now wasting the countries of Europe, the United States unhesitatingly assumes, and to the accomplishment of that task it will devote its energies, exercising always that impartiality which from the outbreak of the war it has sought to exercise in its relations with the warring nations.

I inclose as supplements to this instruction the United States Navy Order of August 18, 1862, and a statement regarding vessels detained by British authorities. These two documents should be transmitted as inclosures in your note to Sir Edward Grey.

I am, etc.,

ROBERT LANSING.

APPENDIX NO. 1

INSTRUCTIONS OF THE SECRETARY OF THE NAVY TO FLAG OFFICERS COMMANDING SQUADRONS AND OFFICERS COMMANDING CRUISERS, RELATIVE TO THE RIGHT OF SEARCH

NAVY DEPARTMENT, August 18, 1862.

SIR: Some recent occurrences in the capture of vessels, and matters pertaining to the blockade, render it necessary that there should be a recapitulation of the instructions heretofore from time to time given, and also of the restrictions and precautions to be observed by our squadrons and cruisers.

It is essential, in the remarkable contest now waging, that we should exercise great forbearance, with great firmness, and manifest to the world

that it is the intention of our government, while asserting and maintaining our own rights, to respect and scrupulously regard the rights of others. It is in this view that the following instructions are explicitly given:

First. That you will exercise constant vigilance to prevent supplies of arms, munitions, and contraband of war from being conveyed to the insurgents, but that under no circumstances will you seize any vessel within the waters of a friendly nation.

Secondly. That, while diligently exercising the right of visitation on all suspected vessels, you are in no case authorized to chase and fire at a foreign vessel without showing your colors and giving her the customary preliminary notice of a desire to speak and visit her.

Thirdly. That when that visit is made, the vessel is not then to be seized without a search carefully made, so far as to render it reasonable to believe that she is engaged in carrying contraband of war for or to the insurgents, and to their ports directly or indirectly by transshipment, or otherwise violating the blockade; and that if, after visitation and search, it shall appear to your satisfaction that she is in good faith and without contraband, actually bound and passing from one friendly or so-called neutral port to another, and not bound or proceeding to or from a port in the possession of the insurgents, then she cannot be lawfully seized.

Fourthly. That, to avoid difficulty and error in relation to papers which strictly belong to the captured vessel, and mails that are carried, or parcels under official seals, you will, in the words of the law, "preserve all the papers and writings found on board and transmit the whole of the originals unmutilated to the judge of the district to which such prize is ordered to proceed; but official seals, or locks, or fastenings of foreign authorities, are in no case, nor on any pretext, to be broken, or parcels covered by them read by any naval authorities, but all bags or other things covering such parcels, and duly seized and fastened by foreign authorities, will be, in the discretion of the United States officer to whom they may come delivered to the consul, commanding naval officer, or legation of the foreign government, to be opened, upon the understanding that whatever is contraband or important as evidence concerning the character of a captured vessel will be remitted to the prize court, or to the Secretary of State at Washington, or such sealed bag or parcels may be at once forwarded to this department, to the end that the proper authorities of the foreign government may receive the same without delay.

You are specially informed that the fact that a suspicious vessel has been indicated to you as cruising in any limit which has been prescribed by this department does not in any way authorize you to depart from the practice of the rules of visitation, search, and capture prescribed by the law of nations.

Very respectfully,

GIDEON WELLES,
Secretary of the Navy.

APPENDIX NO. 2

STATEMENT REGARDING VESSELS DETAINED BY BRITISH AUTHORITIES

September 10, 1915.

(1) Vessels whose cargoes and papers have been of such a character as to require but brief time for examination, have been held in British ports, according to this government's information, for prolonged periods, in some instances for more than a month, and then released without the institution of prize court proceedings.

The steamer *Chester,* which sailed from Baton Rouge for Rotterdam with a cargo of illuminating oil, was taken into Falmouth September 21, 1914, and held until November 4 of that year.

The steamer *Ocean*, carrying the same kind of a cargo, from New York to Rotterdam, was taken into Plymouth September 23, 1914, and similarly released November 5.

The steamer *Charlois* and the steamer *New York*, carrying similar cargoes, were taken into British ports on September 30 and October 12, 1914, respectively, and similarly released on October 27.

The steamers *American* and *Rotterdam*, carrying cargoes of oil to Rotterdam, were also detained under conditions similar to those of the vessels just mentioned in the fall of 1914.

The steamer *Christian Knudsen*, carrying a cargo of oil in bulk, consigned to a Danish corporation in Copenhagen, was brought into the port of Kirkwall, detained for 11 days and then released.

Vessels carrying oil from the United States to long-established markets in Scandinavian countries have repeatedly been detained without being sent to the prize court for adjudication. Among them may be mentioned the *Brindilla*, the *Platuria*, the *Wico*, the *Polarine*, the *Pioneer*, the *Llama*, the *Muskogee*, and the *John D. Rockefeller*.

The steamer *Denver*, which carried a full cargo of cotton from Norfolk to Bremen and which had been loaded under the supervision of a British consular officer, was taken into Kirkwall in January last, as the department was informed by the British Government, just to examine her papers and to verify her cargo.

The *George W. Hawley* was held for a month because she refused to comply with a requirement of the British authorities to discharge a single shipment, the illegal destination of which does not appear to have been disclosed by any evidence. The vessel carried a mixed cargo, including a shipment of oil. The British authorities insisted that the vessel should discharge the oil, which, the shipper represented, was consigned to one of its long-established agents in Sweden. Finally it was announced that the vessel would be released as an act of grace.

The steamer *Wico* was held by the British authorities last March. This government was advised that the British minister at Stockholm had informed the Swedish Foreign Office that the vessel had arrived in a British port with a full cargo of oil for a concern in Stockholm, and that, in view of the recent seizure by a German man-of-war of the steamship *Bryssel* and her cargo, the British Government required complete assurances from the Swedish Government before the *Wico* could be allowed to proceed to destination, that she would not share the fate of the *Bryssel*.

Subsequently this government was informed that the vessel had been allowed to proceed, but that the British Government felt that, in the event of further cargoes going to Stockholm being seized by German ships, the whole question of permitting oil cargoes to proceed to that destination would have to be seriously reconsidered.

The steamer *Llama*, carrying a cargo of oil to a Scandinavian port, was taken into Kirkwall and subsequently released on June 5 last. After departing from Kirkwall the ship was again arrested on June 6, and although the officer of the war vessel which seized the *Llama* apparently was shown the ship's release papers, he placed a prize crew on board and ordered the vessel to Aberdeen and thence to Leith, where she was finally released on June 12, although she could not proceed until June 15, owing to a shortage of coal.

(2). Vessels have been held until they have reconsigned their cargoes to a consignee in a neutral country designated by the British Government.

The steamer *Seguranca*, which carried a general cargo from New York to the Netherlands, was detained at a great loss to the owners of the vessel and to the shippers in a British port for the greater part of last April, in order that her cargo might be reconsigned to the Netherlands Oversea Trust. The manifest showed that the entire cargo was consigned to named consignees in the Netherlands and was accompanied by a certificate

of the British consul general in New York, stating that the loading was supervised by his inspector and that the vessel contained no cargo other than that specified in the manifest. A large part of the cargo, consisting of fresh fruit stored in the hold of the vessel, was subject to decay with great rapidity.

A similar requirement was imposed on the steamer *F. J. Lisman*, which during last June was detained at London. It appears that, after a prolonged detention of the ship of over a month, representatives of the shippers were compelled to discharge both contraband and non-contraband articles, and that the captain and the shippers, finding their efforts to comply with the requirements of the British authorities hopeless, abandoned the voyage.

The steamers *A. A. Raven* and *Vitalia*, carrying articles listed as conditional contraband, were detained in a British port in March last until the goods shipped to specified consignees in Holland could be consigned to the Netherlands Oversea Trust.

The steamer *Neches* was detained last May for about two weeks in order that a shipment of cotton destined for Rotterdam might be consigned to the Netherlands Oversea Trust.

The steamer *Zzandjik* was detained last June, as the department was informed, while the British minister at The Hague made inquiries as to whether the Netherlands Oversea Trust had accepted the consignment of the cargo.

(3) Detentions have been made without evidence amounting to probable cause. The steamer Annam, which was detained at Kirkwall last April, carried a cargo of food products from the United States to Swedish ports. She was detained owing to a "suspicion," as the British Government stated, that a part of its cargo was destined for Germany.

The steamer *Dronning Olga* was detained at Kirkwall in April last and the cargo, which consisted of cotton and food products, was placed in the prize court on the ground, as the department was informed by the British Government, that it was "believed" that it was ultimately destined for Germany.

The steamer *Hilding*, which sailed from New York for Copenhagen with a general cargo consisting largely of food products, was seized and taken into Leith last April, and this government was informed that the cargo had been seized as contraband with the expectation of holding it under the Order in Council of March 11, 1915, if the charge that the goods were contraband should fail.

Numerous similar instances might be cited.

The steamers *Christian Knudsen* and *Platuria*, carrying oil from New York to Denmark, were detained by the British authorities last fall, taken into British ports, and held until the British Government, as they stated, could make an investigation as to the destination of the cargoes. Furthermore, this government was informed that the vessels had been detained pending the receipt of guarantees from Denmark against the exportation of the cargoes, and that the orders were given for the release of the vessels on the receipt of satisfactory guarantees.

The steamer *Brindilla*, which sailed from New York October 13 last with a cargo of oil for Alexandria, was taken into port at Halifax and later realeased, as the department was informed, when the British authorities received information that the ship's cargo was expected at Alexandria.

The steamer *Ambria* was taken into a British port in July last, and this government was informed that this vessel was held pending inquiries that had been instituted concerning destination of certain items of her cargo. About a week later the vessel was allowed to proceed.

In July last this government was informed by the British Government that the prolonged detention of the oil steamers *Polarine*, *Platuria* and *Pioneer* was due to the fact that His Majesty's Government's attention

had latterly been drawn to the very large quantities of oil which had been shipped to Scandinavian countries during the last few months; that there had been every reason to suspect that some of the oil was destined for enemy countries; and that the arrival of the steamers in quick succession necessitated the institution of inquiries as to the ultimate destination of the oil.

The owners of these vessels and their cargoes complained to the government of the United States against their detention, stating that the vessels carried the usual cargoes consigned in good faith to long-established subsidiaries in neutral countries, and further representing that since supplies from Russia and Roumania had been prevented from entering Scandinavian ports, a large increase of business with them had been expected, but it had been found that during the first five months of the year 1915 total shipments of all petroleum products to these countries were less than for the same period last year, although business in previous years had steadily increased.

(4) Vessels have been held, according to statements of the British Government, because of the manner in which shipments have been consigned.

The steamer *Einerjarl* was brought into Kirkwall last May and its cargo of cottonseed cake, shipped from Newport News to Denmark, which the shippers represented was to be used exclusively for consumption in Denmark, was seized. This government was informed that the cargo was discharged because it was consigned "to order."

The steamers *Alfred, Nobel, Bjorstierne, Bjornsen,* and *Friedland* were seized last autumn because their cargoes were consigned "to order."

The shipments on the steamers *America* and *Artemis* have been placed in prize court under the Order in Council of March 11, 1915, because the goods being consigned by the shippers to themselves, there was no guarantee of their ultimate destination.

(5) Goods have been seized by the British Government on the ground, as this government has been informed, that the country to which they were shipped had not prohibited their export.

In the fall of the year 1914, copper shipped from the United States to Sweden on the steamers *Francisco, Antares, Idaho, Tyr,* and *Toronto* was seized by the British authorities, because as the British Government stated, the Swedish Government had not yet prohibited the re-exportation of copper from Sweden.

A consignment of rubber on the Swedish ship *Zamora* had been placed in prize court last January because, as the British Government stated, of the absence of a comprehensive prohibition on the exportation of rubber in all its forms from Denmark.

(6) The British authorities have repeatedly seized articles classified as contraband, articles classified as conditional contraband, as well as non-contraband goods, shipped to Scandinavian countries, to the Netherlands, and to Italy, then neutral, although the re-exportation of such commodities from these countries had been forbidden.

In December last the steamer *Tellus* was ordered to discharge a shipment of copper shipped from New York directly to a consignee in Milan, Italy, although by an Italian decree of November 13, 1914, the exportation of goods shipped in this manner was forbidden.

The steamer *Joseph W. Fordney* was seized 4 miles off the coast of Norway and, in charge of a prize crew, brought into Kirkwall April 8 last. The ship's manifest showed that the cargo consisted entirely of cattle fodder consigned to a person in Malmo, Sweden. It appeared, from information presented to this government, that an affidavit regarding the character and destination of the cargo, made by the shipper of the entire cargo, was attached to the bill of lading, and that this affidavit contained a certification by the British consul general and the Swedish consul and also a statement

by the latter to the effect that the exportation from Sweden of the goods of which the cargo consisted was prohibited. The vessel was brought into a British port and her cargo discharged. This government was informed by the British Government that, apart from the uncertainty of the address of the consignee of the cargo of this vessel, His Majesty's Government had evidence that the cargo was not destined for bona fide Swedish consumption but was intended for Germany.

Numerous other similar instances might be cited, including those of the detention of vessels carrying oil to Scandinavian ports which have been mentioned.

(7) *Detentions have been made pending assurances that embargoed goods would be allowed to pass through a neutral country to Great Britain's allies.*

The steamer *Leelanaw*, which carried a cargo of cotton from Galveston to Gothenburg for transshipment to Moscow, was detained in a British port early in June last. Relative to the detention of this vessel the British Foreign Office said:

"In view of the fact that cotton has now been placed on the Swedish prohibition of export list, His Majesty's Government have not considered it advisable to allow this large cargo to go on to Gothenburg until they are assured that there is a fair chance of it reaching its declared ultimate destination."

After nearly a month's detention the vessel was released on the understanding that she should proceed directly to Archangel.

The steamers *Jentland* and *Syrius* appear to have been recently detained under circumstances similar to those of the steamer *Leelanaw*.

(8) *From time to time this government has been informed of the seizure of cargoes on the ground that consignees have been known to trade with the enemy or because they were suspected of doing so.*

In January last this government was advised by the British Government that the British Government had been compelled to place in prize court a consignment of rubber on board the Swedish vessel *Zamora*, the consignee of these goods being regarded with grave suspicion, and there being reason to believe that the ultimate destination of the rubber was the enemy forces.

(9) *Vessels have been seized and brought into port and have been required by the British authorities to pay pilotage, harbor, unloading, warehouse, storage or other dues, costs, and expenses in advance of a judicial determination of the validity of the seizure of vessel or cargo.*

Instances of such treatment of vessels may be found in the cases of the detention of the steamer *Neches* last May, the *Ogeechee*, which was seized last April, and the *Antilla*, which was seized in February last and subjected to a prolonged detention. In the case of the last mentioned ship, it appears, however, that the cost of discharging was borne by the British Government.

(10) *Detention of vessels proceeding from European ports.*

The steamer *Ogeechee*, which left Bremen April 3 last for the United States, was detained at Sharpness and compelled to discharge its entire cargo, which consisted of approximately 200 shipments of goods urgently needed by American citizens. In most if not all cases it appears that ownership of these goods at the time of the seizure had passed to American consignees. In many instances American citizens had contracted for the sale of the goods consigned to them and were prevented from carrying out their contracts.

The release of shipments on the vessel has been allowed on the production of proofs of American ownership of the goods prior to March 11, 1915. American consignees in order to avoid loss have endeavored to comply with the requirements in the presentation of proofs.

The steamer *Neches*, which sailed from Rotterdam to the United States, was brought to London and compelled, in June last, to discharge cargo on

the ground, apparently, that the goods originated partly in Belgium. The vessel was detained about a month and, after having been damaged to the extent of approximately £1500 as a result of a collision with another vessel while under the control of the British Admiralty, and after having been involved in litigation growing out of such collision, was allowed to proceed.

The following is a list of the vessels detained prior to March 11 last, among which are some regarding the detention of which details have been briefly stated in this memorandum:

"*Platuria, Brindilla, John D. Rockefeller, Kroonland, Noorham, Rotterdam, Sandefjord, Thomas J. Fordney, Fram, Edward Pierce, Ellen, Tellus, Sif, Kim, Canton, Ogeechee, Friedland, Gallileo, Uller, Verona, Zuiderdijk, Greenbrier, Herm, Arkansas, Ascot, Carolyn, Breiford, Bergensfjord, Bjornestjerne, Bjornsen, Ida Cuneo, Kentucky, General Minetonka, General Caloric, Denver.*"

(Here follows a list of about 285 vessels, with dates of arrival and departure, covering intervals usually of from one to five days, though sometimes longer. Frequent instances are noted in which the vessels were turned over to prize crews and their cargoes put in the prize court.)—*N. Y. Times*, 8/11.

SEIZURE OF MEAT CARGOES.—The text of a memorandum prepared by the British Government on the detention and confiscation of cargoes of meats and meat products consigned by Chicago packers to Scandinavian countries, was published October 12. The British Government points out that these shipments were not seized under the Order in Council, but as conditional contraband, and declares that it has in its possession documentary evidence, so strong as to amount to certainty, that the shipments were made to neutral countries with the intention on the part of the packers of having them delivered in Germany.

FURTHER CHECK ON SHIP TRANSFERS.—By an Order in Council published on October 25 the British Government declared its intention no longer to be bound by Article 57 of the Declaration of London, which states that "subject to the provisions respecting the transfer to an enemy flag, the neutral or enemy character of a merchant vessel is determined by the flag she is entitled to fly." The meaning is that the status of merchant vessels henceforth will be determined not by the flag, but by ownership.—*N. Y. Nation*, 28/10.

ASQUITH ON CONDUCT OF THE WAR.—In an address to the House of Commons, November 2, Premier Asquith made the following significant statements regarding British war policy:

1. That he believed that the Earl of Derby's recruiting plan would render compulsion unnecessary, but that if it failed, he would make proposals to the House "involving some form of legal obligation."

2. That in future there would be co-ordination between the staffs of the Allied powers.

3. That, confident of the Allies' triumph in the war, he would not surrender his task while he enjoyed health and the confidence of the king and country.

4. That there was full agreement between Great Britain and France to maintain the independence of Serbia and not let her "become the prey of the sinister and nefarious combination of Germany, Austria, and Bulgaria."

5. That ex-Premier Venizelos of Greece, whose advocacy of intervention in the war on the side of the Entente Allies led to his resignation, asked France and Great Britain on September 21 for 150,000 men, with the express understanding that Greece would mobilize.

6. That he [the Premier] accepted his full share of responsibility for the first attack on the Dardanelles, which resulted in failure, with the loss of

several capital ships. He said that this attack was made after full investigation and consultation with naval experts, and that it was sanctioned by the government, notwithstanding some doubts in the mind of its principal naval adviser.

7. That the allied forces in Gallipoli were holding up 200,000 Turks, and that the situation in the Dardanelles was "receiving the most anxious consideration of the government, not as an isolated thing, but as part of the larger strategical question raised by reason of developments in the Balkans."

8. That in the Sea of Marmora British submarines had sunk or damaged two battleships, five gunboats, one torpedo-boat, eight transports and 197 supply ships.

9. That the financial situation was serious, and the nation must be prepared to make yet greater sacrifices.

10. That Field Marshal Sir John French had nearly 1,000,000 soldiers under his command.

11. That the total British casualties in France and Flanders were 377,000.

12. That the Germans in that area had not made a net gain of a foot of ground since April.

FRANCE

NEW COALITION MINISTRY.—The resignation of M. Delcassé, French Minister of Foreign Affairs, was announced October 13, the resignation resulting from cabinet friction regarding foreign policy.

The entire cabinet resigned on October 28, M. Viviani being succeeded as Premier by the Socialist leader M. Briand. The latter has gathered a strong coalition ministry, representative of all parties. M. Briand becomes his own Minister for Foreign Affairs, but included in the cabinet is M. Jules Cambon, formerly ambassador at Washington, Madrid, and Berlin, as General Secretary of the Ministry of Foreign Affairs. General Gallieni succeeds M. Millerand as Minister of War, and M. Viviani becomes Minister of Justice. M. Briand's policy is announced to be the vigorous prosecution of the war until a "just peace" shall be obtained.

GERMANY AND AUSTRIA

On October 5 Secretary Lansing made public a letter from Ambassador Bernstorff disavowing the sinking of the *Arabic*, pledging his government to pay an indemnity for American lives lost, and stating that stringent orders had been issued to prevent the recurrence of similar attacks. The text of the letter follows:

MY DEAR MR. SECRETARY: Prompted by the desire to reach a satisfactory agreement with regard to the *Arabic* incident, my government has given me the following instructions:

The order issued by His Majesty, the Emperor, to the commanders of the German submarines of which I notified you on a previous occasion has been made so stringent that the recurrence of incidents similar to the *Arabic* case is considered out of the question.

According to the report of Commander Schneider of the submarine which sank the *Arabic* and his affidavit, as well as those of his men, Commander Schneider was convinced that the *Arabic* intended to ram the submarine.

On the other hand the Imperial Government does not doubt the good faith of the affidavit of the British officers of the *Arabic*, according to which the *Arabic* did not intend to ram the submarine. The attack of the submarine was undertaken against the instructions issued to the com-

mander. The Imperial Government regrets and disavows this act, and has notified Commander Schneider accordingly.

Under these circumstances my government is prepared to pay an indemnity for American lives which, to its deep regret, have been lost on the *Arabic*. I am authorized to negotiate with you about the amount of this indemnity.

I remain, my dear Lansing, yours very sincerely,

J. VON BERNSTORFF.

—*N. Y. Times*, 6/10.

"HESPERIAN" SUNK BY TORPEDO.—Mr. Robert Lansing, Secretary of State, announced on October 30 that the United States Navy Department examination had definitely indicated that a fragment of the engine of war which sank the Allan line steamship *Hesperian* was a part of a torpedo. The German Government has persistently denied that the *Hesperian* was torpedoed. In the opinion of the United States naval experts the fragment could not have been a part of a marine mine. The officers of the *Hesperian* insisted that it was a torpedo, and some of them had seen its wake, it was said. Mr. Lansing said the result of the Navy Department's investigation would be communicated either to the German government directly or to Count von Bernstorff, the German ambassador. Germany previously made to the United States a qualified disclaimer of responsibility for the sinking of the *Hesperian*.—*Army and Navy Journal*, 6/11.

SETTLEMENT OF "FRYE" CASE—SAFETY OF CREWS.—In a note to Germany October 12, Secretary Lansing acknowledges Germany's consent to settle the *Frye* indemnity by joint commission. In regard to Germany's reservation of the right to destroy vessels containing absolute contraband, pending settlement of questions of treaty interpretation, the note states that, "without admitting that the Declaration of London is in force, and on the understanding that the requirements in Article 50 of the declaration that 'before the vessel is destroyed all persons on board must be placed in safety' is not satisfied by merely giving them an opportunity to escape in lifeboats, the government of the United States is willing, pending the arbitral award in this case, to accept the Declaration of London as the rule governing the conduct of the German Government in relation to the treatment of American vessels carrying cargoes of absolute contraband. On this understanding the government of the United States agrees to refer to arbitration this question of treaty interpretation."

SECOND AUSTRIAN PROTEST AGAINST ARMS SALES.—In a second protest against arms shipments, dated September 24, Austria, while admitting the legality of trade in munitions under normal circumstances, contends that the extraordinary development of the manufacture and export of these materials from the United States, the fact that the United States is practically the only neutral nation extensively engaged in such trade, and the advantage thus afforded to one group of belligerents, make the situation exceptional and an embargo on arms a reasonable measure of neutrality. It is suggested, furthermore, that an embargo on arms might be employed as an effective and justifiable measure of retaliation against British trade restrictions.

"WHITE BOOK" DOCUMENTS

A GERMAN VIEW OF MUNITIONS' SHIPMENTS.—A second installment of what has come to be popularly known as the American "White Book" of diplomatic correspondence was issued October 27 by the State Department. In it is the following German memorandum regarding trade in arms and

supplies to war vessels off a neutral coast. In the opening sentence the memorandum admits the legitimacy of trade in munitions of war.

The memorandum follows:

Under the general principles of international law no exception can be taken to neutral states letting war material go to Germany's enemies from or through their territory. This is accordant with Article 7 of The Hague Convention of October 18, 1907, concerning the rights and duties of neutrals in naval and land warfare. If, however, a state avails itself of that liberty in favor of her enemies, then it must in accordance with a rule generally accepted in international law and confirmed in Article 9 of the two conventions above cited, place no obstacle to the German military force ordering contraband from or through its territory. . . . . In spite thereof, various American port authorities have denied clearance from American ports to vessels of the Merchant Marine which would carry needy supplies or fuel to German warships either on the high seas or in other neutral ports. According to the principles of international law above cited, a neutral state need not prevent furnishing supplies of this character; neither can it, after allowing the adversaries to be furnished with contraband, either detain or in any way disable a merchant ship carrying such a cargo. Only when contraband trade would turn the ports into bases of German military operations would the unilateral stoppage of the trade of those vessels become a duty.

Such perhaps would be the case if the Germans kept coal depots in the ports, or if the vessels called at the port in regular voyages on the way to German naval forces. But it stands to reason that one merchant vessel occasionally sailing with coal or supplies for German warships does not turn a neutral port into a German point of support contrary to neutrality.

Our enemies draw from the United States contraband of war, especially arms, worth several billions of marks. This in itself they are authorized to do, but if the United States would prevent our warships occasionally drawing supplies from its ports a great injustice grows out of the authorization, for it would amount to an unneutral treatment of the belligerents and constitute a breach of the generally accepted rules of neutrality to Germany's detriment.

The Secretary of State in his reply said:

"The essential idea of neutral territory becoming the base for naval operations by a belligerent is, in the opinion of this government, repeated departure from such territory of merchant vessels laden with fuel or other supplies for belligerent warships at sea. In order to ascertain the vessels which are thus operating, the government has been obliged to investigate certain cases, in order that it might determine whether there have been or are about to be repetition of such acts, but in all respects equality of treatment has been observed toward all merchant vessels suspected of carrying supplies to belligerent vessels."

Never to Arm for Attack.—The ruling of the State Department that it was permissible for merchant ships to arm for defensive purposes, drew forth a note from the British Embassy on instructions from the Foreign Office, giving "the fullest assurances that British merchant vessels will never be used for purposes of attack; that they are merely traders armed only for defence; that they will never fire unless first fired upon, and that they will never under any circumstances attack any vessel."

The German Government, in a memorandum transmitted by Ambassador Gerard, took exception to the view that merchant vessels were permitted to defend themselves against a war vessel, and argued that it was a question whether or not armed merchant ships "should be admitted into neutral ports at all," the extent of armament being held as affording "no guaranty that ships armed for defensive purposes only will not be used for offensive purposes under certain circumstances."

The answer was that the United States held that to permit vessels of small armament to enjoy the hospitality of American ports as merchant vessels was not a violation of neutrality.

"Nevertheless," the American reply adds, "the government of the United States is not unmindful of the fact that the circumstances of a particular case may be such as to cause embarrassment and possible controversy as to the character of an armed private vessel visiting its port. Recognizing, therefore, the desirability of avoiding a ground of complaint this government, as soon as a case arose, while frankly admitting the right of a merchant vessel to carry a defensive armament, expressed its disapprobation of a practice which compelled it to pass upon a vessel's intended use, which opinion, if proven subsequently to be erroneous, might constitute a ground for a charge of unneutral conduct.

"As a result of these representations no merchant vessels with armament have visited the ports of the United States since December 10. In fact, from the beginning of the European War, but two armed private vessels have entered or cleared from ports of this country and as to these vessels their character as merchant vessels was conclusively established."

Defended "Odenwald" Attack.—The correspondence relating to the attempt of the German ship *Odenwald* to sail from San Juan, Porto Rico, without clearance papers, furnishes another interesting chapter of the volume. The State Department's note, in answer to the German Government's complaint that the port authorities opened fire on the steamer without warning, concludes after a long review of the evidence that "the United States authorities at San Juan in the performance of their duties avoided any act endangering the safety of the vessel and the lives of the persons on board and exercised no greater force than was necessary to prevent the illegal departure of the *Odenwald* from the port of San Juan."

The case of August Piepenbrink, an American citizen of German birth, who was taken from an American vessel on the high seas by the French cruiser *Conde*, was the subject of long exchanges. The *Trent* case, in the Civil War, was cited as a basis for the American demand for the release of Piepenbrink.

The text of a note from Foreign Minister Delcassé to Ambassador Sharp at Paris, shows that Great Britain and France never admitted the American contention, although the prisoner was surrendered "as a special favor." The Allies argued that Piepenbrink was not really an American citizen, having only declared his intention to become naturalized. The State Department set forth the view that "there is no justification in international law for the removal of even an enemy's subject from a neutral vessel on the high seas bound to a neutral port, even if he could properly be considered as a military person."—*N. Y. Times*, 29/10.

ANCONA DISASTER.—About noon on **November 7**, the Italian liner *Ancona*, Naples via Messina to New York, was fired on, torpedoed, and sunk in the Mediterranean between Tunis and Sardinia, by a submarine flying Austrian colors. Of the crew and passengers, 208 were lost, among them eleven American citizens. The Austrian and Italian official statements follow:

The statement issued by the Austro-Hungarian Admiralty says the sinking took place as follows:

"The submarine fired one shot in front of the *Ancona's* prow, whereupon the steamer fled at full speed, in accordance with the order issued by the Italian authorities, which instructs ship commanders to flee or sink

the submarine. The submarine pursued the steamer and continued firing, but the vessel stopped only after being hit several times.

"The submarine allowed 45 minutes for the passengers and crew to abandon the steamer, on board of which panic reigned, but only a small number of boats were lowered, and these were occupied principally by the crew.

"A great number of boats, probably sufficient to save all the passengers, remained unoccupied.

"After a period of 50 minutes, as another steamer was approaching, the submarine submerged and torpedoed the *Ancona*, which sank after an additional 45 minutes.

"If any of the passengers lost their lives this was due to the fault of the crew, because the steamer tried to escape after it had received orders to stop, and then the crew only saved themselves and not the passengers.

"Reports published in the foreign press that the submarine fired on the *Ancona's* lifeboats are mendacious inventions. When the steamer stopped the submarine ceased firing."—*N. Y. Times*, 15/11.

ITALY'S OFFICIAL STATEMENT.—The government of the United States is doubtless aware of the particulars reported by the press in connection with the outrage perpetrated by the enemy upon Italian shipping on November 7.

More than once the destruction of Italian merchantmen had taken place under circumstances which permitted no other explanation than that there was behind the procedure a ruthless purpose to use brutish force against private property of innocent persons. Noncombatant passengers and crews already have been the victims of these methods, but never has there been an instance of such unparalleled atrocity as in the case of the sinking of the *Ancona*. The unarmed liner, en route to New York, was steaming westward between the coasts of Sardinia and Tunis, carrying passengers and cargo destined for America.

It was out of the question that the vessel could have been suspected of carrying arms or contraband or persons in the service of any of the belligerents. In fact, none of the circumstances alleged in other cases in an attempt to justify actions described by the authors as a necessity of war, or as a reprisal, were present in the case of the *Ancona*.

There are principles that no state ought to disregard and no private individual could violate with impunity. Respect for the lives of persons in no way participants in a war is among these fundamental rules of humanity and international law. This rule imposes upon belligerents the strict obligation to do all in their power in every circumstance to protect the lives of such passengers.

Without any warning whatsoever, without even a blank shot, without observing any of the formalities accompanying the right to search, the submarine encountered by the *Ancona* in the aforesaid circumstances opened fire upon the unarmed passenger liner, relentlessly shelling not only the wireless apparatus, sides and decks of the ship while she was at a stop, but even the lifeboats in which the terrorized passengers were seeking refuge. Many of the passengers were killed outright or wounded. Some who approached the submarine in the hope of rescue were driven off with jeers. As a result of this inhuman procedure more than 200 men, women, and children lost their lives.

The Royal Government regards it as a duty to denounce solemnly to all nations the circumstances described above. Their sentiments of justice and humanity will cause them without doubt to judge as it deserves the conduct of an enemy which is obviously contrary to the dictates of civilization and the recognized principles of international law.—*N. Y. Times*, 16/11.

UNITED STATES SEEKS DETAILS

WASHINGTON, November 16.

Secretary Lansing cabled to Frederic Courtland Penfield, the American Ambassador at Vienna, to-day, instructing him to demand of the Vienna Government a detailed account of the sinking of the Italian liner *Ancona* off the coast of Tunis last week with the loss of more than 200 lives. Ambassador Penfield is directed to obtain from the Austro-Hungarian Government information along certain specific lines. What the American Government wishes to ascertain from Austria is:

Whether the *Ancona* was properly warned, and how the warning was given.

Whether the *Ancona* tried to escape after the warning shots were fired and to what extent the firing was continued after it began.

Whether any shots were fired after the *Ancona* halted, and whether the small boats were shelled, as alleged by the Italian Government, while passengers were entering them or after they had been lowered.

Whether any steps were taken to save the lives of the noncombatants by the commander of the submarine, and, if no such steps were taken, what justification the commander offered for his failure to make an attempt to save the lives of noncombatants.

The instructions to Ambassador Penfield will afford the Austrian Government not only an opportunity to come forward with the evidence upon which it bases its statements, but will also open the way for a statement on Austria's attitude toward merchant liners and neutral vessels in the conduct of its submarine warfare in the Mediterranean.—*N. Y. Times*, 17/11.

BULGARIA

At 4 p. m. on **October 4**, Russia presented to Bulgaria the following ultimatum, requiring that she break with the Central Powers and expel German officers from the staff of her army:

PETROGRAD, October 3.

The Russian minister at Sofia has been requested to hand to M. Radoslavoff, the Bulgarian prime minister, the following note:

Events which are taking place in Bulgaria at this moment give evidence of the definite decision of King Ferdinand's Government to place the fate of its country in the hands of Germany.

The presence of German and Austrian officers at the Ministry of War and on the staffs of the army, the concentration of troops in the zone bordering on Serbia, and the extensive financial support accepted from our enemies by the Sofia Cabinet no longer leave any doubt as to the object of the present militiary preparations of Bulgaria.

The powers of the Entente, who have heart the realization of the aspirations of the Bulgarian people, have on many occasions warned M. Radoslavoff that any hostile act against Serbia would be considered as directed against themselves.

The assurances given by the head of the Bulgarian Cabinet in reply to these warnings are contradicted by facts.

The representative of Russia bound to Bulgaria by the imperishable memory of her liberation from the Turkish yoke, cannot sanction by his presence preparations for fratricidal aggression against a Slav and Allied people. The Russian minister has, therefore, received orders to leave Bulgaria, with all the staffs of the legation and the consulates, if the Bulgarian Government does not within 24 hours openly break with the enemies of the Slav cause and of Russia, and does not at once proceed to send away the officers belonging to the armies of the states who are at war with the powers of the Entente.

A telegram from Sofia states that M. Savinsky, the Russian minister, is confined to bed with appendicitis. The minister's condition was at first serious, but has improved. King Ferdinand has made inquiries regarding his progress.—*Press Association War Special, Naval and Military Record*, 6/10.

On **October 5**, King Ferdinand having rejected Russia's ultimatum, the ministers of the Allied Powers demanded their passports. Bulgaria declared war on Serbia **October 14**. England formally declared war on Bulgaria **October 15**, and a blockade of the Ægean coast of Bulgaria was announced on **October 16**. Italy and Russia declared war on Bulgaria **October 19**, Russia issuing at the same time the following manifesto:

PETROGRAD, October 19, via LONDON, October 20.

The following imperial manifesto has been issued:

"We hereby make known to all our loyal subjects that the treason of Bulgaria to the Slav cause, prepared with perfidy since the beginning of the war, has now, although it seemed impossible, become an accomplished fact. Bulgarian troops have attacked our loyal Ally, Serbia, already bleeding in the struggle against a stronger enemy.

"Russia and the great powers, our Allies, tried to dissuade the government of Ferdinand of Coburg from taking this fatal step. The realization of the ancient aspirations of the Bulgar people regarding the annexation of Macedonia was assured by Bulgaria by other means, in conformity with Slav interests, but underhand methods prompted by the Germans and fratricidal hatred of the Serbians triumphed.

"Bulgaria, our co-religionist, liberated but a short time ago from the Turkish yoke by the fraternal love of the Russian people, openly took sides with the enemies of the Christian faith, Slavism, and Russia.

"The Russian people regard with sorrow the treason of Bulgaria, which was so near to it until these last few days, and, with bleeding heart, it draws its sword against her, leaving the fate of the betrayer of the Slav cause to the just punishment of God."

BULGARIANS DECLARE WAR ON SERBIA

ATHENS, October 14.

The Bulgarian minister announced to-day to the Greek Government that, in consequence of Serbian attacks at two points on the Bulgarian frontier, Kustendil and Tren, as a result of which 70 Bulgarians were killed and 500 wounded, Bulgaria is at war with Serbia since 8 o'clock this morning.—*London Times*, 15/10.

BULGARIA'S MOTIVES.—The text of a manifesto disseminated in 20,000 copies by the Bulgarian ministry of M. Radoslavoff, to explain why Bulgaria joined Germany, Austria-Hungary, and Turkey in the war, was published in the *Frankfurter Zeitung* of October 8.

The wording of some paragraphs of the manifesto seems to indicate that it was written anonymously. Russia, it says, is fighting for Constantinople, France for Alsace-Lorraine, England for commercial supremacy over Germany, and "Italy, Serbia, and Montenegro simply for loot."

Explaining the advantages in Bulgaria's initial policy of "loyal neutrality," the document says:

"In the beginning no one could foresee how events would develop and which side would win the victory. If the government had decided to take part in the great war, it might have made the mistake of joining the side

that will be defeated, and in that manner it would have made the existence of the Bulgarian Empire the stakes. On the other hand, the popular confidence in our leaders had been weakened by reason of the scant success of our last two wars, and the people would not have gone to war so gladly, especially if this war were to be waged hand-in-hand with Serbia, toward which land we feel great bitterness and hatred."

Moreover, the manifesto points out, Bulgaria was not prepared politically for war at that time, not yet having recovered in an economic sense from the ravages of the war with Turkey.

The earlier "loyal neutrality" of Bulgaria, the document says, resulted in these advantages: the possibility of bringing itself in a military and economic sense up to the highest degree of preparedness it has ever attained; the avoidance of the enormous sacrifices it would have had to make if it had entered the war a year ago; the possibility of recuperating from the economic ravages of the previous war, whereas entry into the war earlier would have found the country with a scant wheat crop and only a good corn crop, involving the probability of a bread famine among the populace. Now, on the other hand, it has been able to export in the interim all its export material at two and three times the earlier prices. Furthermore, its earlier neutrality permitted it to till its fields, so that now 20 per cent more soil is under cultivation than in other years, while if Bulgaria had mobilized earlier it would not have been able to sow more than 60 per cent of its present crops, which would scarcely have sufficed for its own provisioning, and left nothing for export. Likewise, earlier mobilization would have cut off the present import of goods, whose price, already two and three times the normal price, would then have risen tenfold, and would have been chiefly felt by the poor.

The manifesto calls attention to the German loan recently made to Bulgaria, adding that after the Balkan War, when, "humbled, but not destroyed," Bulgaria asked France for a loan, the request was refused categorically, unless Bulgaria would recognize the Bucharest treaty and agree "not to carry on an independent policy," and to throw ourselves completely into the arms of the then Triple Entente, which would dispose of us as it pleased.

"Our Russophiles were at that time raging," it continues, "and demanded the unqualified acceptance of the terms. Now we can see and realize how diabolical were those plans and suggestions and how Bulgaria would have become a plaything in the hands of Russia and France and would have disappeared from the face of the earth. In those heavy days for Bulgaria Germany came to its assistance and gave it the required loan without any political conditions whatsoever. Every impartial Bulgar is in duty bound to confess that through this loan Germany saved us from bankruptcy, as well as from political subjugation. The war has shown how mighty Germany, and even Austria-Hungary, is in an economic sense. If these states, therefore, desire it, they have always the power to render us valuable support. They have done so till now, and we have no reason to suppose that they will not support us also in the future. On the contrary, from the assurances in German newspapers and statements of German statesmen we can with full confidence count upon German financial help. Even as we write these lines we are informed that Germany has again granted us a loan of 125,000,000 lewas ($25,000,000) for the defraying of current debts, without any political conditions.

What the Allies Offered.—"We do not know the wording of the famous note which the Quadruple Entente has delivered to the Bulgarian Government; but from what has been said and written in the newspapers, these facts are seen:

"1. They Russia and its Allies give us nothing for our neutrality, but, on the other hand, demand that we shall take part in the war as soon as possible.

"2. That Bulgaria is to turn over its armies to the Quadruple Entente, placing them fully at the Entente's disposal, leaving the Entente to command them and send them wherever it finds advisable.

"3. That the Bulgarian Army must conquer Constantinople and then hand it over to Russia; and,

"4. In return for all this, Bulgaria is permitted to retain the territory up to the Enos-Midia line, and it is promised some obscure and insufficient compensations in Macedonia, but only in case Serbia is sufficiently compensated by Austria."

We can with certainty state that the promises of Germany and Austria-Hungary to Bulgaria for its neutrality are, in the main, as follows:

"1. All of Macedonia, including Skopie, Bitolia, Ochrida, etc.

"2. Friendly mediation between Bulgaria and Turkey for the purpose of ceding the line to Dedeagatch and the territory west of the right bank of the Maritza. This agreement with Turkey is expected in a short time.

"Still further territorial promises have been made to us at the expense of Serbia by the Central Powers, in case of our active military assistance.

"Finally, we must hold to that group of the powers which will win the victory in the present war, since only so can the important territorial extensions and further developments be insured. From the developments of the operations in the various theaters of the war, on the front against France and Belgium as well as the fronts against Italy, Russia, and Serbia, one recognizes more clearly day by day that victory is inclining on the side of Germany and Austria-Hungary. We need not linger long over the question, inasmuch as it has become clear to the point of certainty for every observer that Russia, which has lost fortresses like Warsaw and Ivangorod, will soon be overthrown, and then the turn will come for France, Italy, England and Serbia. Germany has proved that it is so strongly organized in a military and material sense and can dispose of such enormous, superior, and inexhaustible forces as will enable it soon to overthrow its foes.

"Under these circumstances Bulgaria would commit a crime against itself, it would simply be committing suicide, if it did not side with the Central Powers, since these alone are the ones who can make it possible for us to realize our hopes for the unification of the Bulgarian people."—*N. Y. Times*, 24/10.

BULGARIA TO RUSH GRAIN TO GERMANY

BERLIN, November 13 (via London).

The Bulgarian markets have been opened for the supplying of the people of Germany and Austria-Hungary with grain, provisions and fodder.

By an agreement just concluded between the Central Purchasing Institute of Berlin, otherwise known as the grain monopoly, and the Bulgarian authorities, the Bulgarian surplus of provisions and fodder will be placed at the disposition of the institute.

The first transaction covers the surplus of the 1915 maize crop, which has been purchased at a price 50 per cent above the quotations in peace times.

The first barges already are being loaded for transportation by way of the Danube. It is stated that shipments will shortly be in progress by way of the Nish-Belgrade Railroad.

GREECE

On September 30 Greek mobilization measures were ratified and a war loan of $30,000,000 authorized by the Greek Chamber of Deputies. No opposition, other than a formal protest, was

offered to the landing of French and British forces at Salonica. (According to the statement of Premier Asquith, **November 2**, Venizelos had on **September 21** asked the Allies for 150,000 men, on the promise of Greek mobilization.) Owing, however, to King Constantine's refusal to support his policy of aid for Serbia, Premier Venizelos resigned. A coalition ministry, under Zaimis, was formed **October 7**, with the avowed policy of "armed neutrality," and with the tentative support of the Venizelos party.

Greece the week following refused to consider herself bound by the Serbo-Greek treaty of 1913, which required Greece to aid Serbia in the event of an attack by a third Balkan power. This she did on the ground that Serbia was being attacked by two other powers in addition to Bulgaria, that the attack was an incident in the general European War, and that the participation of Greece would bring disastrous consequences upon her, without helping her ally.

Announcement was made **October 21** that Great Britain had offered Greece the immediate cession of Cyprus, with other territorial and financial concessions, as the price of active adherence to the cause of the Allies. This offer was refused (**October 23**), Greece in a manifesto insisting on the "benevolence" of her neutrality and indicating that she distrusted the adequacy of the Allied forces in Serbia. On **November 7**, following the overthrow of the Zaimis cabinet (**November 4**), a new ministry was formed under M. Skouloudis, composed with but one exception of members of the preceding ministry. On **November 10**, King Constantine dissolved Parliament, calling a new election to be held in December. A new election is scarcely practicable without demobilization. It is held by the Venizelos party that the King, in dissolving Parliament, has exceeded his constitutional powers.

GREECE AND THE ENTENTE

LONDON, Tuesday, November 16.

An intimation of the Greek Government that any Entente Allied troops seeking refuge in Greek territory will be disarmed has been the cause of considerable anxiety to the Entente powers, and consequently Field Marshal Earl Kitchener's Near East visit gains added importance.

According to dispatches received from Athens, Greece bases her decision on international law, while the Entente ministers contend that the right accorded troops to enter the country through Saloniki permits them to retire by the same route, should it become necessary for them to do so. The ministers are demanding that Greece define unequivocally the attitude she will observe should such an eventuality present itself.

Besides the claims to hospitality which the Entente Allies declare they have on Greece in view of the then Premier Venizelos's invitation to them

to send a force to Saloniki to enable Greece to fulfill her treaty obligations to Serbia, which, however, Greece repudiated, Earl Kitchener or the Entente ministers are likely to draw the attention of King Constantine and his government to the fact that the constitutionalism of Greece was guaranteed by France, Russia, and Great Britain, and that it was only obtained after Great Britain had ceded the Ionian Islands to that country and the three powers had agreed to contribute £4000 ($20,000) yearly for the personal use of the King.

This, it is contended, binds the Greek people to the Entente Allies, and should King Constantine overrule the constitution, which the followers of M. Venizelos insist he did when he dissolved the Chamber, it is suggested in some quarters that King Constantine would be reminded that his retention of the throne of Greece depends on the continuance of friendly neutrality toward the Entente Powers.—*N. Y. Times*, 17/11.

GREEK KING'S PACT WITH KAISER

LONDON, October 26.

Dr. Dillon, the well-known correspondent and authority on Near Eastern affairs, wires the following from Rome, under Sunday's date, to *The Daily Telegraph:*

"Repeatedly I have stated, what I know to be an absolute fact, that, while the Greek Cabinet is under no treaty obligation to the central empires, King Constantine is bound to the Kaiser by a solemn promise to maintain neutrality toward Germany and all her Allies in return for compensations guaranteed by the Kaiser's word. Among the compensations promised by the Kaiser to Greece are the Island of Cyprus and all that the most imperialistic Greeks aspired to in Albania.

"Between Bulgaria and the Greek Cabinet no stipulations have been concluded respecting mutual relations during the war and no negotiations on the subject have been carried on. The Kaiser guaranteed that Bulgaria's behavior toward Greece during the war and afterward would be inspired by considerations of amity and that her egotistic tendencies would be circumscribed by regard for conciliatory German counsels. During the campaign Bulgaria and Greece would conduct themselves toward each other as friends and after the conclusion of peace they would square accounts and regulate their territorial boundaries under Germany's friendly guidance.

"King Constantine pledged his word to employ every lever which his constitutional prerogatives or monarchic authority and influence might place within his reach to maintain neutrality.—*N. Y. Times*, 27/10.

Ever since the Treaty of Bucharest I have held and expressed the conviction that King Constantine was, and, so long as he reigns, will remain absolute master of the destinies of Greece. He has it in his power to undo the creative work of Venizelos, and as he is tied by positive stipulations with the Kaiser, he will exercise that power. (Note written in October.)—*The Balkan Imbroglio, Dr. E. J. Dillon, Fortnightly Review*, November.

CHINA

REFERENDUM ON MONARCHICAL GOVERNMENT

PEKING, October 10.

The monarchical movement has recently taken a quasi-constitutional form, and the hope that its development would be suspended until after the war has disappeared. The State Council, a nominated body acting in a legislative capacity pending the indefinitely deferred assembling of Parliament, has passed a bill providing for the constitution of a special body to pronounce upon this burning question. Members numbering 2000, nominally representative of all classes, will telegraph their votes for or

against from 28 centers throughout the country to the State Council at Peking, which body presumably will adopt the same method of giving effect to the expressed convictions of the majority.

The President, despite his disapproval of the movement, has duly promulgated the bill and given it as much legal authority as such an instrument can possess in a state subject to a purely personal rule. It is claimed that the votes thus recorded by provinces representing an enormous electorate, uninfluenced by the atmosphere of Peking, will truly indicate the national wishes. But as in the elections the voters are all controlled by officials, and every official in the country is tumbling over his fellows to endeavor to earn favor in the sight of Peking, it will be more difficult, except in a few special regions, to register an anti-monarchical vote than to pass a hippopotamus through the barrel of a small-bore rifle.

The steps necessary for obtaining the country's opinion will be completed in a few weeks, after which there is every indication that it is intended to take steps that will end in China almost immediately becoming a monarchy once more. It is needless to say that the plan described makes no mention of any collateral arrangements to give the monarchy a constitutional character, though this is ostensibly the object of the movement.—*London Times*, 11/10.

JAPANESE ADVICE.—Representations were made on October 28 by the Japanese chargé d'affaires in Peking, on behalf of Japan, Great Britain, and Russia, advising the Chinese Government to suspend till the end of the war the contemplated change from a republican to a monarchical constitution, in view of the danger that might arise to the peace of the Orient. The proposals were rejected by the Chinese Government on Monday, the Vice-Minister of Foreign Affairs stating that he had been advised by provincial officials that they would be able to maintain order in the event of the proposed referendum resulting in a decision favorable to the restoration of a monarchy.—*N. Y. Nation*, 14/11.

NAVAL NOTES

Naval developments in the following strategic areas will be considered separately and in turn:

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2. BALTIC SEA	2133
3. ADRIATIC SEA	2137
4. ÆGEAN SEA	2138
5. BLACK SEA	2140
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7. PACIFIC	2149

BELLIGERENTS' WAR LOSSES

(On the left margin of this table of losses is a page reference to the Naval Institute War Notes.)

LOSSES OF BRITAIN AND HER ALLIES.

BRITISH WARSHIP LOSSES

PAGE	NAME	CLASS	TONNAGE	HOW LOST	DATE
245, 653, 1874	Audacious	dreadnought	25,000	By mine, Irish Coast	27-10-14
247	Bulwark	battleship	15,000	Internal explosion	26-11-14
644	Formidable	battleship	15,000	Torpedoed off Plymouth	1- 1-15
658	Irresistible	battleship	15,000	By mine, Dardanelles	18- 3-15
1374	Majestic	battleship	14,900	Torpedoed	27- 5-15
658	Ocean	battleship	12,950	By mine, Dardanelles	18- 3-15
1373	Goliath	battleship	12,950	Torpedoed	12- 5-15

PAGE	NAME	CLASS	TONNAGE	HOW LOST	DATE
1374	Triumph	battleship	11,800	Torpedoed	26- 5-15
271, 1886	Monmouth	armored cruiser	9,800	By gun fire, Coronel	1-11-14
271, 1886	Good Hope	armored cruiser	14,100	By gun fire, Coronel	1-11-14
1863	Aboukir	armored cruiser	12,000	By Submarine U-9	22- 9-14
1863	Hogue	armored cruiser	12,000	By Submarine U-9	22- 9-14
1863	Cressy	armored cruiser	12,000	By Submarine U-9	22- 9-14
2133	Argyll	armored cruiser	10,850	Wrecked east of Scotland	28-10-15
1583	Warrior	protected cruiser	13,550	By mine	5- 9-14
249	Hermes	protected cruiser	5,600	Torpedoed by U-12	31-10-14
253, 1583	Pathfinder	light cruiser	3,000	By submarine U-21	5- 9-14
1583	Pegasus	light cruiser	2,135	By gun fire, Zanzibar	20- 9-14
1567	Amphion	scout cruiser	3,500	By mine	5- 8-14
1867	Hawke	unarmored cruiser	7,350	By submarine U-9	13-10-14
1364, 1004	Maori	destroyer	1,035	By mine, Belgium	7- 5-15
1728	Lynx	destroyer	935	Mined, North Sea	9- 8-15
1364, 1007	Recruit	destroyer	385	Torpedoed, North Sea	1- 5-15
1583	Speedy	gunboat	810	By mine, North Sea	3- 9-14
1366	No. 10	torpedoboat	215	Torpedoed	10- 6-15
1366	No. 12	torpedoboat	215	Torpedoed	10- 6-15
2140	No. 96	torpedoboat	——	Collision, Gibraltar	1-11-15
247, 1873	D-5	submarine	550	By mine	3-11-14
1871	E-3	submarine	725	By mine	18-10-14
2146	E-20	submarine	800	Sunk in Dardanelles	5-11-15
1583	A-E-1	submarine	725	Foundered in Australia	14- 9-14
1018	E-15	submarine	725	Torpedoed to avoid capture	18- 4-15
	D-2	submarine	600	Missing	
2147	E-7	submarine	725	Sunk, Dardanelles	9-15
	E-10	submarine	725	Missing	
1727, 2136	E-13	submarine	——	Stranded, Denmark	19- 8-15
1373	A-E-2	submarine	725	Sunk by enemy	30- 4-15
	Fishguard II	training ship	——	Foundered in North Sea	18- 9-14
250, 1873	Niger	torpedo gunboat	810	Sunk by submarine	11-11-14
1874	Oceanic	troop ship	18,000	Accidentally rammed	8- 9-14
1365	Princess Irene	auxiliary cruiser	5,934	Blown up, Sheerness	27- 5-15
	Clan McNaughton	armed merchantman	4,985	Wrecked	3- 2-15
	Rohilla	armed merchantman	7,400	By mine	30-10-14
649	Viknor	armed merchantman	5,386	Wrecked	14- 1-15
1005	Bayano	auxiliary cruiser	5,248	Torpedoed	11- 3-15
1728	India	auxiliary cruiser	7,900	Torpedoed, North Sea	8- 8-15
1755	Royal Edward	transport	11,117	By submarine, Aegean	14- 8-15
2138	Marquette	transport	7,057	Torpedoed, Ægean Sea	11-15
2138	Ramazan	transport	——	By submarine, Ægean	19- 9-15
2140	Tara	armed merchantman	6,322	Submarine, Ægean	5-11-15
1729	Ramsey	patrol vessel	——	Sunk by Meteor	8- 8-15

FRENCH WARSHIP LOSSES

658	Bouvet	battleship	12,205	By mine, Dardanelles	18- 3-15
1012	Leon Gambetta	armored cruiser	12,000	By submarine, Taranto	27- 4-15
656	Dague	destroyer	720	By Austrian mine	24- 2-15
666	Mosquet	torpedoboat destroyer	298	Gun fire by Emden	28-10-14
	No. 347	torpedoboat	98	Sunk in collision	9-10-14
	No. 338	torpedoboat	97	Sunk in collision	9-10-14
647	No. 219	torpedoboat	87	Sunk off Nieuport	1-15
	Zelée	gunboat	680	By gun fire	28-10-14
260	Curie	submarine	398	Destroyed off Pola	12-14
655	Saphir	submarine	390	Wrecked	17- 1-15
1756	Mariotte	submarine	522	Sunk, Dardanelles	26- 7-15
1375, 1755	Casabianca	minelayer	495	Internal explosion	4- 6-15
2142	Turquoise	submarine	390	Gun fire, Marmora	1-11-15

RUSSIAN WARSHIP LOSSES

467, 666	Jemtchug	cruiser	3,050	Torpedoed by Emden	28-10-14
	Pallada	cruiser	7,775	By German submarine	11-10-14
	Putschino	torpedoboat		By gun fire	30-10-14
261	Prut	minelayer	5,500	By gun fire, Black Sea	29-10-14
	Donetz	gunboat	1,200	By gun fire, Odessa	29-10-14
1367	Yenissei	transport	——	Sunk by submarine	6- 6-15
	Kubanetz	gunboat	1,200	Sunk off Odessa	28-10-14
	Oleg	minelayer	1,125	Sunk Black Sea	24-12-14
	Athos	minelayer	1,743	Sunk Black Sea	24-12-14
	Riasan	transport	3,522	Captured by Emden	6-8-14
1732	Sivutch	gunboat	960	Gun fire, Gulf of Riga	16- 8-15

JAPANESE WARSHIP LOSSES

PAGE	NAME	CLASS	TONNAGE	HOW LOST	DATE
1878	Takachiho	old armored cruiser	3,700	By torpedo, Tsingtau	17-10-14
	Shirotaji	destroyer	380	Wrecked, Tsingtau	4- 9-14
	Name unknown	torpedoboat	——	By mine	
	33	torpedoboat	110	By mine, Tsingtau	11-11-14

ITALIAN WARSHIP LOSSES

2137	Benedetto Brin	battleship	13,215	Explosion, Brindisi	28- 9-15
1371	Amalfi	armored cruiser	9,958	Torpedoed	7- 7-15
1371	Giuseppe Garibaldi	armored cruiser	7,234	By Austrian submarine	18- 7-15
1370	Turbine	destroyer	330	Scuttled	24- 5-15
1370	Medusa	submarine	300	Torpedoed	17- 6-15

LOSSES OF GERMANY AND HER ALLIES

GERMAN WARSHIP LOSSES

1732	Moltke(?)	battle cruiser	22,640	Submarine, Riga	8-15
632	Blücher	armored cruiser	15,500	By gun fire, North Sea	24- 1-15
1368, 1734	Pommern(?)	battleship	10,000	By British submarine	2- 7-15
276, 673, 1385	Gneisenau	armored cruiser	11,600	By gun fire, Falkland Is	8-12-14
276, 673, 1385	Scharnhorst	armored cruiser	11,600	By gun fire, Falkland Is	8-12-14
247	Yorck	armored cruiser	9,050	By mine, Jahde Bay	3-11-14
2135	Prince Adalbert	armored cruiser	9,050	Submarine, off Libau	23-10-15
258	Friedrich Karl	armored cruiser	8,858	By mine in Baltic	12-12-14
	Karlsruhe	unarmored cruiser	4,900	Blown up(?)	11-14
1566	Augsburg	protected cruiser	4,280	By gun fire	7- 8-14
1566	Magdeburg	protected cruiser	4,478	By gun fire, Baltic	27- 8-14
1569, 1856	Mainz	protected cruiser	4,280	By gun fire, Helgoland	28- 8-14
1569, 1856	Koeln	protected cruiser	4,280	By gun fire, Helgoland	28- 8-14
1569, 1856	Ariadne	protected cruiser	2,660	By gun fire, Helgoland	28- 8-14
270, 670, 1388	Koenigsberg	protected cruiser	3,550	By gun fire, Rufigi River	4- 7-15
2135	Undine	protected cruiser	2,672	By submarine, off Sweden	7-11-15
262, 666, 1880	Emden	third class cruiser	3,544	By gun fire, Cocos I.	9-11-14
262, 666, 1880, 2153	Leipzig	light cruiser	3,250	By gun fire, Falkland Is	8-12-14
276, 673, 1386	Nürnberg	light cruiser	3,450	By gun fire, Falkland Is	8-12-14
1387	Dresden	light cruiser	3,544	By gun fire	14- 3-15
1871, 1861	Hela	small cruiser	2,040	By submarine E-9	13- 9-14
283	Geier	small cruiser	1,630	Interned in Honolulu	8-11-14
1584	Cap Trafalgar	auxiliary cruiser	9,854	By gun fire, Africa	14- 9-14
1578	Kaiser Wilhelm der Grosse	auxiliary cruiser	14,350	By gun fire, Africa	27- 8-14
986	Prinz Eitel Friedrich	converted cruiser	8,865	Interned in Norfolk	7- 4-15
986	Kronprinz Wilhelm	converted cruiser	14,705	Interned in Norfolk	29- 4-15
252	Berlin	converted cruiser	17,324	Interned in Norway	16-11-14
	Patagonia	converted cruiser	——	Seized by Argentina—violation of neutrality	
	Eber	converted cruiser	1,000	Interned at Bahia	9-14
282	Kormoran II	converted cruiser	3,508	Interned at Guam	15-12-14
	V-186	destroyer	750	By gun fire	
1860	V-187	destroyer	650	By gun fire, Helgoland	28- 8-14
	S-106	destroyer	675	By gun fire	
1878	S-90	destroyer	400	Ran ashore and destroyed	20-10-14
1869	S-115	destroyer	420	By gun fire, off Holland	17-10-14
1869	S-117	destroyer	420	By gun fire, off Holland	17-10-14
1869	S-118	destroyer	420	By gun fire, off Holland	17-10-14
1869	S-119	destroyer	420	By gun fire, off Holland	17-10-14
1861	S-126	destroyer	487	By submarine	6-10-14
250	S-124	destroyer	350	Accidentally rammed by Danish steamer	23-11-14
1730	G-196 (type)	destroyer	——	Sunk, North Sea	26- 7-15
1726	Name unknown	destroyer	——	Sunk off Zeebrugge	22- 8-15
270	Taku	destroyer	280	Sunk at Tsing-tao	6-11-14
270	Iltis	river gunboat	900	By gun fire, China	6-11-14
270	Luchs	river gunboat	900	By gun fire, China	6-11-14
270	Tiger	river gunboat	900	By gun fire, China	6-11-14
270	Jaguar	river gunboat	900	By gun fire, China	6-11-14
	Hedwig von Wissmann	gunboat	200	Captured	20- 8-14
	Tsing-tau	gunboat	168	Interned, China	17- 8-14
270	Kormoran	gunboat	1,630	By gun fire, Tsingtau	6-11-14
1732	Two light cruisers		——	Gulf of Riga	17- 8-15
1732	Eight torpedo-boats		——	Gulf of Riga	17- 8-15
	Vaterland	gunboat	168	Interned, China	17- 8-14

PAGE	NAME	CLASS	TONNAGE	HOW LOST	DATE
1729..	U-27	submarine	800..	Sunk, North Sea	8-15
	U-51	submarine	——..	Sunk, Black Sea	17- 7-15
250..	U-18	submarine	750..	Rammed by patrol boat	23-11-14
648..	U-3	submarine	——..	Rammed	9- 8-14
1568..	U-15	submarine	250..	Rammed, North Sea	9- 8-14
1009..	U-29	submarine	800..	Lost with all hands	3-15
2132..	U-8	submarine	187..	Rammed off Dover	4- 3-15
	U-12	submarine	250..	Rammed, British Channel	10- 3-15
	U-14	submarine	300..	Sunk	16- 6-15
	A-2	torpedoboat	150..	Gun fire	1- 5-15
	A-6	torpedoboat	150..	Gun fire	1- 5-15
1566..	Koenigin Luise	minelayer	948..	By gun fire, North Sea	5- 8-14
	Navarra	auxiliary cruiser	3,641..	By Orama's gun fire	11-11-14
1386..	Macedonia	supply ship	4,347..	Captured	4-15
	Moewe	survey ship	650..	By gun fire	9- 8-14
1885..	Komet	old destroyer	——..	Captured, New Guinea	16-10-14
	Planet	survey ship	650..	By gun fire, Yap Island	
	Locksun	naval tender	1,020..	Interned in Honolulu	8-11-14
	Karnac	auxiliary transport	4,437..	Interned in Chile	11-14
1364..	Ophelia	hospital ship	1,153..	Captured	17-10-14
1368, 1734..	Albatross	minelayer	——..	Run ashore	2- 6-15
	Bethania	armed merchantman	4,848..	Captured	9-14
	Spreewald	armed merchantman	2,414..	Captured	12- 9-14
	Graecia	armed merchantman	1,697..	Captured	10-14
	Itolo	armed merchantman	165..	Gun fire	9-14
1729..	Meteor	auxiliary cruiser	3,613..	Sunk, North Sea	8- 8-15

AUSTRIAN WARSHIP LOSSES

270..	Kais'n Elizabeth	protected cruiser	4,000..	Sunk off Tsingtau	6-11-14
	Beethoven	converted cruiser	2,069..	By mine	17-12-14
1574..	Zenta	light cruiser	2,300..	By gun fire, French fleet	16- 8-14
1584..	No. 19	torpedoboat	78..	Sunk by mine, Pola	17- 8-14
	Name unknown	torpedoboat	——..	Sunk by mine in Adriatic	
	Name unknown	torpedoboat	——..	Sunk by mine in Adriatic	
	Name unknown	submarine	——..	Gun fire, French fleet	19-10-14
	Temes	Danube monitor	440..	Mined	23-10-14
	U-11	submarine	860..	Sunk by aeroplane	1- 7-15
	Name unknown	gunboat	——..	Sunk, Adriatic	24- 5-15
1735..	U-12	submarine	1,000..	Sunk by submarine	11- 8-15
1734..	U-3	submarine	300..	By French destroyer	13- 8-15

TURKISH WARSHIP LOSSES

260..	Messudiyeh	battleship	10,000..	Sunk by British submarine	13-12-14
1757..	Barbarossa	battleship	9,901..	By British submarine	9- 8-15
1375..	Medjidieh	armored cruiser	3,300..	Mined	3- 4-15
1376..	Three transports with troops		——	Sunk by Russian warships	
1376, 1757..	Berk-i-Satvet (type)	gunboat	725..	By mine near Dardanelles	29- 4-15
	Burak Reis	gunboat	500..	Scuttled	1-11-14
	Issa Reis (type)	gunboat	420..	Mined	12-14
1019..	Dhair Hissar	torpedoboat	97..	Driven ashore, Greece	17- 4-15
1376..	Pelenk-i-Deria	gunboat	775..	Torpedoed	23- 5-15
	Bezemialen	troop ship	——..	Sunk, Black Sea	14-11-14
	Bachriachmar	troop ship	——..	Sunk, Black Sea	14-11-14
	Midiat Pasha	troop ship	——..	Sunk, Black Sea	14-11-14
1757..	Yar Hissar	torpedo boat	——..	Sunk by submarine	6- 9-15
2142..	Carmen	transport	4,424..	Submarine, Marmora	24-10-15

NORTH SEA

BELGIAN COAST BOMBARDMENT.—On two occasions during the past week the German communiqués have referred to the bombardment of the Belgian coast by British warships. On October 1 the communiqué said that "enemy monitors unsuccessfully bombarded the environs of Lombartzyde and Middelkerke." On October 4 it was stated that "early yesterday morning five monitors appeared before Zeebrugge and directed a fruitless fire against the coast. Three Belgian inhabitants fell victims to their fire." As regards the first of these attacks, it was announced in the French official communiqué issued on October 2 that "Our heavy artillery in Belgium co-operated with the British fleet in the bombardment of the German batteries at Westende." The second attack was not mentioned by the French, but a statement from

Amsterdam said that the British warships shelled the coast heavily for nearly three-quarters of an hour on the morning of the 3d. No statement from the Admiralty concerning the bombardment in this region has been made, but in his special order of the day, dated September 30, Sir John French said: "We are also much indebted to Vice Admiral Bacon and our naval comrades for the valuable co-operation of the fleet."—*Army and Navy Gazette*, 9/10.

DAMAGE TO THE "LION" AND THE "TIGER."—The Germans have persistently claimed that the battle cruiser *Tiger*, of the British Navy, was sunk in the battle-cruiser fight in the North Sea. The British have denied this, although they have admitted that Rear Admiral Beatty's flagship, the *Lion*, was disabled and had to be towed home. That the *Tiger* was not lost is now established by the testimony of the well-known war correspondent, Frederick Palmer, who visited the British main fleet and was permitted to write an exceedingly frank article about what he there witnessed. He saw the *Lion* and the *Tiger*, and he tells us that the former was hit 15 times, and the *Tiger* eight times in the Dogger Bank fight. The turret of one of the ships was hit on the roof, but only a small fragment passed through, resulting in the temporary disablement of one gun. Another shot passed through the side of the ship and burst, the fragments striking the barbette harmlessly. The description of what he saw is contained in the last issue of *Collier's* and is extremely interesting and shows that "all's well" with the British main fleet.—*Scientific American*, 30/10.

MONITORS IN NAVAL WAR.—The three monitors of the *Severn* type, which began the bombardment in this quarter a year ago, have been officially stated during the past three months to be operating in the Dardanelles and the Indian Ocean, and the five vessels mentioned by the Germans must, therefore, be new or improvised ships.

The utility of this class of shallow-draft vessels, mounting long-range guns—which was unrepresented in our navy before the war—is one of the most interesting surprises of the naval operations up to the present time. The nature and extent of their achievements, and their freedom from accident or loss, reflect great credit on those who introduced them into the fleet and on the officers and men responsible for their handling in action.

The Monitors' Designer.—Originally intended for service on the Brazilian rivers, the "monitors" of the *Severn* class were purchased just before the outbreak of war by the British Government, and have done excellent work on the coast of Belgium, at the Dardanelles, and in the destruction of the *Königsberg* in the Rufigi River. They were designed and built by Messrs. Vickers (Limited) at their works at Barrow-in-Furness.—*London Times*, 9/10.

"U-8" TOWED INTO A DUTCH PORT.—A German submarine in distress, said to be the *U-8*, previously reported destroyed and her crew taken prisoners, was towed into Terschelling, a Dutch island in the North Sea, by a Dutch lifeboat November 4. A Dutch torpedo-boat saw the rocket signals sent up by the submarine and escorted her to an anchorage. There seems to be some mystery about the number of this boat, as German submarines of late have not been marked as formerly, by orders of the German Admiralty.—*Army and Navy Journal*, 6/11.

BRITISH CATCH SUPERSUBMARINES

LIVERPOOL, Wednesday, 8.40 p. m.

The *Daily Post* publishes a report of the capture of one of Germany's latest supersubmarines, 250 feet long and carrying in addition to torpedo tubes four guns of fairly large caliber. The submarine was launched at Stettin a fortnight ago.

The *Post* states that within a few hours after leaving her base she was caught "in one of those traps we have so skilfully laid for these craft somewhere in the German Ocean."—*N. Y. Herald*, 4/11.

BRITISH CRUISER RUNS ASHORE; CREW SAVED

LONDON, October 28, 1.50 p. m.

The British cruiser *Argyll* has run aground and may be a total wreck. All hands were rescued. This was made known by the Admiralty to-day in the following announcement:

"H. M. S. *Argyll*, Captain James Tancred, R. N., grounded this morning off the east coast of Scotland. Owing to bad weather prevailing, it is feared she may become a total wreck. All her officers and crew have been saved."

The *Argyll*, 10,850 tons displacement, was laid down in 1902. Her normal complement is 855. She is 450 feet long. Her largest guns are 7.5-inch, of which she carries four. She has six 6-inch, two 3-inch and twenty-two 3-pound guns and two torpedo-tubes.—*N. Y. Times*, 29/10.

BALTIC SEA

THE SUBMARINES IN THE BALTIC.—During the whole course of the war nothing has occurred more dramatic than the successes achieved by British submarines in the Baltic. The Germans have been reduced to a state of panic, particularly now that Russian submarines are co-operating, and it has been possible to carry on operations on a large scale. They have been dependent upon the import of iron ore and other metals from Sweden. Unexpectedly these supplies have been cut off. People in this country have taken this development almost as a matter of course, as though it were more or less what they expected to happen sooner or later. The fact is that the commanders of these submarines have been performing what may be regarded almost as miracles, which cannot fail to have their influence on the course of the war. It is calculated that between October 11 and October 23, 20 German ships were sunk, with a total tonnage of upwards of 38,000. If we had suffered injury to this extent during a similar period, it might have been honestly claimed that we had not sustained serious damage, because all our ports are open, and every week from 1300 to 1500 ships arrive or leave. But Germany's position is very different. Her merchant vessels have been driven off every sea except one. Her Baltic ports have been supplying her with a limited quantity of such raw materials for munitions as Sweden can sell her. The traffic has not been large, and now it has practically stopped; owing to the extent of the damage inflicted by the submarines ships are now afraid to venture forth. The underwater craft have been sinking ships at an average rate of about two a day since the early part of last month, and the reports indicate that most of the vessels have been well laden. In pursuing these tactics, the commanders have been teaching the Germans lessons in manners and humanity. The work has been carried out in accordance with the requirements of international law, and, so far as is known, not a single life has been lost. German merchant sailors have, it is true, been drowned lately in the Baltic, but the agent has been not British or Russian torpedoes, but German mines, which have broken loose.—*Naval and Military Record*, 3/11.

BRITISH VESSELS' GOOD WORK IN THE BALTIC.—The Press Bureau sanctioned the publication by *The Liverpool Daily Post* of the following list of German ships reported to have been sunk by British submarines in the Baltic between October 11 and 23:

October 11.—*Lulea:* In Lloyd's Register there are two German steamers of this name, one being a steel screw steamer of 2289 tons, built in 1889, and the other a steel screw steamer of 1495 tons, built in 1902. One registers at Labeck, and the other at Hamburg.

October 12.—*Germania:* Steel screw steamer of 1096 tons, built in 1904, registered at Hamburg.

October 13.—*Director Reppenhagen:* Steel screw steamer, 1683 tons, built in 1893, registered at Stettin. *Nicomedia:* Steel screw steamer, 4391 tons, built in 1901, registered at Hamburg. *Walter Leonhardt:* Steel screw steamer, 1261 tons, built in 1902, registered at Hamburg.

October 15.—*Svania* (*Svanen ?*): Steel screw steamer, of 668 tons, built in 1911, registered at Halmstad. *Gertrude:* Steel screw steamer, 1038 tons, built in 1907, registered at Stettin. *Pyrgos:* Steel screw steamer, 3588 tons, built in 1906, registered at Hamburg. *Emgard* (not in Lloyd's Register).

October 18.—*Babylon:* Steel screw steamer, 2489 tons, built in 1896, registered at Hamburg.

October 19.—*Pernambuco:* Steel screw steamer, 4788 tons, built in 1897, registered at Hamburg. *Soderhamn:* Steel screw steamer, 1499 tons, built in 1899, registered at Hamburg.

October 20.—*Johannes Russ:* Steel screw steamer, 1751 tons, built in 1908, registered at Hamburg. *Hernosand:* Steel screw steamer, 1182 tons, built in 1894, registered at Hamburg. *Dalalfven:* Steel screw steamer, 1046 tons, built in 1910, registered at Hamburg. *John Wulf* (not in Lloyd's register). *Hernosand* (2d ?): Iron screw steamer, 465 tons, built in 1865, registered at Stockholm.

October 23.—*Electra:* There are two steamers in Lloyd's Register of this name as being registered in Germany. One is a steel screw steamer of 1261 tons, built in 1898, and the other a steel screw steamer of 835 tons, built in 1899. The first vessel is owned by Holm and Nolzen, and registered at Flenburg, and the second is owned by Dampschifffahrts Ges Neptun, registered at Bremen. *Rensburg:* Steel screw steamer, 4639 tons, built in 1910, registered at Hamburg, and owned by the Deutsch-Austral Drupfsch Ges. *Plaven:* Steel screw steamer of 4210 tons, built in 1907, registered at Hamburg, and owned by the Deutsch-Austral Drupfsch Ges.—*Naval and Military Record,* 3/11.

TIME DECISIONS, SALVAGE, LOSSES, ETC.—A Stockholm despatch says that 17 German ore steamships which ply in the Baltic Sea are missing. They are believed to have been sunk by British submarines. It is not anticipated that any issues with Great Britain will arise through the operations of British submarines in the Baltic for the reason that no American passengers or seamen are expected to be found on any German ship in those waters. There are now 41 German ships, mostly iron ore carriers, blockaded in Swedish waters.—*Shipping Illustrated,* 23/10.

BRITISH SUBMARINES.—Mr. Balfour in answer to a question whether he could confirm the statements made officially in Petrograd and furnish any details regarding the torpedoing of a large German cruiser in the Baltic by a British submarine during the week ended August 22, said: "We feel precluded from giving information about the proceedings of the Russian fleet beyond that which the Russian Government think it expedient to publish in the press. The British submarines which have done such excellent service in the Baltic are not an independent force, but are acting under the command of the Russian admiral."—*Army and Navy Gazette,* 9/10.

FIVE TRANSPORTS SUNK

PETROGRAD, Saturday.

An official statement issued here to-night announces:

"In the Baltic British submarines have sunk five German transports, and have forced another to run ashore."—*Naval and Military Record,* 20/10.

RUMOR OF BATTLE IN THE BALTIC.—According to unofficial advices from Copenhagen, Denmark, October 15, a small German squadron in the Baltic sent to aid German shipping harassed by British submarines fared badly. The British submarines, it was reported, sunk a destroyer and two torpedo-boats at the southern entrance to the Sound, a narrow strait between Denmark and Sweden, which connects the Baltic with the North Sea.

A semi-official statement issued at Berlin October 20 denied the Russian report that six German transports were sunk in the Baltic. Only commercial steamships, the statement says, have been sunk, and several of these have been sent to the bottom within Swedish territorial waters. Commercial traffic in the Baltic is said to be going on as usual.—*Army and Navy Journal*, 23/10.

GERMAN ARMORED CRUISER "PRINZ ADALBERT" SUNK.—The German armored cruiser *Prinz Adalbert*, was sunk off Libau, in the Baltic, October 23, by a British submarine, which fired two torpedoes at the ship, as stated in Russian official despatches, and only a small portion of the crew could be rescued. This loss was also confirmed by the German Admiralty. The *Prinz Adalbert* was an armored cruiser 394 feet in length and with a displacement of 9050 tons. She had a complement of 557 men and was completed in 1903. Her speed was 21 knots and her main battery was four 8.2-inch guns. Other guns included ten 6-inch, ten 15½-pounders and ten 1-pounders. She had four inches of armor amidships, and a 3-inch belt on the ends. Her turrets had six inches of armor. She burned both coal and oil and had triple screws.—*Army and Navy Journal*, 30/10.

GERMAN CRUISER "UNDINE" SUNK

BERLIN, Monday, via LONDON, 3.25 p. m.

"The small cruiser *Undine*," says the official announcement, "was sunk by two torpedoes from a submarine on the afternoon of November 7 while patrolling the south Swedish coast. Nearly the entire crew was saved."

The *Undine* was a protected cruiser of 2672 tons displacement, 328 feet long and 15.8 feet depth. Her armament consisted of ten 4.1-inch guns and two 18-inch torpedo-tubes. She was built in 1901 at Howaldt.—*N. Y. Herald*, 9/11.

GERMAN MINEFIELD IN BALTIC.—According to a Berlin telegram on September 22, the German *News for Mariners* announces that at the south outlet of the sound a new minefield is being laid. A pilot service will be established. The minefield allows a space of 55 yards of safe water between it and the Danish minefield off the Drogeden lightship, and this is the only passageway for large warships and merchant vessels, although small ships can get through on the Swedish side from Trindelsledn and Korranan. In shape the minefield is elliptical, and is situated south of the Danish island of Saltholm, on which *E-13* grounded on August 19. —*Army and Navy Gazette*, 2/10.

PATROL BOAT BLOWN UP.—It was announced at Copenhagen on October 18 that a German mine patrol boat had been blown up in the Baltic. The crew, consisting of 10 men, are supposed to have been killed. Wreckage of the boat has been found at Marstal. Another report referred to the vessel as a minelayer guarding the entrance to the Langeland belt, and stated that she was torpedoed on October 18 by a British submarine.—*Army and Navy Gazette*, 23/10.

THE NEW BALTIC MINEFIELD.—It is not surprising that anxiety should have been caused in Denmark by the announcement that the German Admiralty have laid a new minefield in international waters, south of the outlet from the sound into the Baltic. These obstructions have been placed im-

mediately south of the Danish Island of Saltholm, where the British submarine *E-13* went aground some weeks ago. The new minefield has been laid at the point where the water begins to deepen, and the Germans no doubt anticipate that it will facilitate the work of their patrol vessels. Though the Danes are much perturbed by this development, and though the Germans are using Danish, as well as Swedish waters, for their patrol vessels, there is no indication that either of these neutral countries intend to take any action. They are both anxious, above all, to keep out of the war, even although in doing so they may compromise their position as Baltic Powers. If Germany, under peace conditions, had suggested that she would lay a minefield in the position chosen we may be sure that energetic protests would have been made. Under war conditions, however, the enemy has claimed practically a free hand in the Baltic, and there is no one to say to him nay—at present.—*Naval and Military Record*, 29/9.

GERMANS BOMBARDED FROM THE GULF OF RIGA

PETROGRAD, Monday.

The following naval communiqué was issued here to-night:

On September 25, at eight o'clock in the morning, during a bombardment by our vessels of the enemy land positions on the Gulf of Riga, a stray enemy projectile fell on one of our ships and killed the commander, Capt. Viazemsky, and also Capt. Evinine.

At 10 o'clock in the morning our vessels concluded the bombardment of the positions, having reduced all the batteries to silence.

Besides the aforementioned losses, we had five men killed and eight wounded.—*Naval and Military Record*, 29/9.

MERCHANTMAN CAPTURED BY A SUBMARINE.—That it is perfectly feasible for submarines to capture unarmed merchant steamers and take them into port sometimes, was demonstrated by the Russian torpedo-boat *Alligator*, which in the Baltic Sea, as announced in a Russian official despatch of October 28, captured a German steamer near the Aland Islands and took it to a Russian port.—*Army and Navy Journal*, 6/11.

SWEDISH SUBMARINE FIRED ON

COPENHAGEN, Thursday.

A telegram from Malmö reports that the Swedish submarine *Hvalen* was fired on off Ystad about 8 o'clock this morning by a German submarine, which mistook her for a British vessel.

An officer was severely wounded and a sailor slightly. The submarine was slightly damaged. The telegram adds that the Malmö squadron of the Swedish fleet has gone to Ystad.—*Naval and Military Record*, 27/10.

DESTRUCTION OF "E-13."—On the morning of August 20 a strange ship was noticed aground off the southern end of Saltholm Island. The man who first saw it, one of the Dragør pilots, gave the alarm and notified the military authorities as soon as it became clear that the vessel in question was a British submarine.

It soon appeared that she was the *E-13*, one of the newest additions to the English fleet.

On Wednesday night *E-13* had come down from the North, and had run aground while trying to pass through this very narrow channel. Her captain turned to the westward a good hundred yards too soon, and grounded near Holmetinge in shoal water.

The people of Dragør had been able to see German torpedo-boats ever since the war and these, which had been patrolling the coast, of course, noticed the stranded ship. They approached to within range and opened fire on the English vessel. The engagement was carefully watched from

Dragør. As soon as the German guardship had ascertained that the stranded submarine was no Dane, two torpedo-boat destroyers began to sneak up on her from the eastward; as they came closer they made out the white ensign floating over the unfortunate vessel, and noticed that the whole crew was being mustered on deck.

The Germans approached to within a short range, but swung off again to the southward, in order to hold a council of war with the rest of the flotilla. Then they returned to the attack and let go a torpedo which missed the Britisher by a few feet, struck the bottom and exploded.

The English could not answer this fire, as their bow was hard and fast aground, so that torpedo-tubes and guns all bore on the unengaged side.

The Germans, however, came nearer and nearer, until at a distance of about 300 yards both destroyers were able to use their full broadsides with destructive effect. Shells struck all over the submarine. One of the first demolished the conning-tower, and the fore and after-body was punctured in a hundred places, and soon a violent explosion in the bowels of the ship sent a column of broken plates and bits of machinery spouting out of the doomed vessel.

The neighborhood now became too warm for most of the Danish spectators and boats could be seen rowing frantically in all directions. All Dragør had turned out to see the fight and every eminence was occupied by crowding watchers.

At about 10.30 *E-13* was shot as full of holes as a cook's colander; the deck was covered with dead and wounded, but the white ensign still flew at the staff.

The rumor that *E-13* was also attacked by a water plane was found to be erroneous; the machine seen was a Swedish army aero, piloted by Netzlin, a well-known Swedish aviator. The latter had come to watch the fight, having heard the firing.—*Translated by Midshipman H. J. White, from the Nord Deutsche Allgemeine Zeitung.*

ADRIATIC

EXPLOSION IN ITALIAN BATTLESHIP "BENEDETTO BRIN"

BRINDISI, September 28.

A fire followed by an explosion broke out on board the Italian battleship *Benedetto Brin.* Up to now eight officers and 379 bluejackets are known to have been saved. Among those who lost their lives is Rear Admiral Rubin de Cervin.

The cause of the fire is not yet known. The explosion occurred in the after magazine while the ship was lying in Brindisi harbor. There is no question of foul play.—*Reuter.*

ROME, September 28.

The disaster, although causing general distress owing to the loss of life, strengthens the general determination to do the utmost to continue the war to a victorious issue. The *Benedetto Brin* was 16 years old, and thus was not among the most modern ships of the Italian Navy. It is expected that the disaster will hasten the appointment of a Minister of Marine.

Signor Salandra, the Prime Minister, has addressed to the Duke of the Abruzzi, comanding the naval forces, the following telegram:

"I have read the report of Admiral Presbitero regarding the explosion in the *Benedetto Brin,* in which it was announced that a commission had been appointed to hold an immediate inquiry into the causes of the explosion, and that the commission would proceed with its work with the assistance of experts who had been asked for. But I, interpreting and sharing the grave impression which the news of the loss of the powerful ship and so many lives of brave officers and men will produce in the country, beg your Royal Highness to assume directly the task of ascertaining the causes of the sad event, seeking, without regard for persons, to find who may have been responsible, and reassuring the country and the

navy, which has been, and wishes to be, exposed to the enemy's blows, but not to the immense dangers arising, perhaps, from negligence or slackness, which must be rigorously inquired into and revealed and the responsible parties must be punished."

September 29.

Work for recovering the armament of the *Benedetto Brin* is already being actively carried on. Several guns have already been removed, and salvage equipment is being sent for the recovery of the heavier artillery.—*Reuter.*

. . . . The *Benedetto Brin* is a battleship of 13,215 tons displacement, laid down at Castellamare in 1899 and launched in 1901. She carries four 12.40-inch caliber guns, four 8-inch, twelve 6-inch, and 24 other guns, and four submerged torpedo tubes. Her heavy armament necessitated a certain sacrifice of armor. Her belt has a maximum thickness of 5¾ inches (Terni steel), and the turrets and barbettes 8 inches. At her trials she developed a speed of 20 knots. The *Benedetto Brin*, which is a sister ship of the *Regina Margherita*, carries a complement of about 810 officers and men.—*London Times.*

FRENCH SUBMARINE ATTACK.—Reference was made in these notes last week to the attack on September 9 of a French submarine attached to the Italian Naval Force against a flotilla of Austrian torpedo-boats which were encountered off Cape Planka. The following additional details were published in Rome on September 21:

The hostile boats were steaming at the rate of 15 knots per hour, and the submarine prepared to attack a torpedo-boat destroyer of the *Hussar* type. Just as she was about to fire a torpedo, an enemy torpedo-boat steamed between the submarine and the vessel of the *Hussar* type.

Without hesitation some torpedoes were fired at her, one of which hit the torpedo-boat, causing serious damage. The commander of the submarine reports that he does not believe that the enemy torpedo-boat was *No. 51 T*, of 200 tons, built in 1906, as was stated in the Austrian communiqué, but was one of a more modern type, of at least 250 tons.—*Army and Navy Gazette*, 25/9.

ÆGEAN

BRITISH TRANSPORT "RAMAZAN" SUNK.—The War Office announces that the British transport *Ramazan* was sunk by an enemy submarine by shell fire at 6 a. m. on September 19, off the Island of Antikythria, in the Ægean Sea. There were about 500 Indian troops on board, of whom 75 were saved. Twenty-eight of the crew also were saved. A number of boats were smashed by shell fire.

The survivors reached Antikythria in their own boats the same night and were kindly and hospitably treated by the inhabitants.—*N. Y. Herald*, 6/11.

BRITISH TRANSPORT "MARQUETTE" TORPEDOED.—The War Office announces that the British transport *Marquette* has been torpedoed in the Ægean Sea. It is understood that only 99 of the personnel are unaccounted for.

No further details have yet been received.

. . . . The *Marquette* is a steel screw four-mast steamer of 7057 tons. She was built by A. Stephen & Sons, Glasgow, in 1898, and is owned by the Atlantic Transport Company (Limited), her port of registry being West Hartlepool.

The *Marquette* is the third British transport reported to have been attacked in the Ægean Sea by an enemy warship.

The first case was that of the *Manitou*, which was conveying troops for the Dardanelles. On April 17 a Turkish torpedo-boat fired three torpedoes at the vessel, all of which missed, but a boat containing a number of men

capsized and 24 men were drowned and 27 others were reported as missing. The torpedo-boat was chased by the British cruiser *Minerva* and destroyers, and was finally run ashore in Kalamuti Bay (Chios) and destroyed.

The other transport was the *Royal Edward*, sunk by a submarine on August 14. She carried some 1600 persons. Of these 600 were saved. The troops on board consisted mainly of reinforcements for the 29th division and details of the Royal Army Medical Corps.—*London Times*, 27/11.

BULGARIAN BLOCKADE.—War was declared by Great Britain on Bulgaria from 10 p. m. on October 15. The declaration was made "In view of the fact that Bulgaria has announced that she is at war with Serbia, and is an ally of the Central Powers." On the following day it was officially announced that the vice admiral commanding the Eastern Mediterranean squadron of the Allied fleets has declared a blockade of the Bulgarian coast in the Ægean Sea commencing from 6 a. m. on Saturday, the 16th inst. Forty-eight hours grace from the moment of the commencement of the blockade was assigned for the departure of neutral vessels from the blockaded area.—*Army and Navy Gazette*, 23/10.

BULGARIAN COAST BOMBARDED.—The Secretary of the Admiralty makes the following announcement:

"A bombardment of the Bulgarian coast was carried out by an Allied squadron, composed of British, French and Russian ships, on the afternoon of October 21.

"A number of military positions were shelled, and serious damage was inflicted upon the harbor works, railway station, and shipping at Dedeagatch.

"Great care was exercised by the Allied squadron to avoid firing upon any points other than those known to be of military importance."—*Naval and Military Record*, 27/10.

SUBMARINE HAVOC IN MEDITERRANEAN SEA.—Count von Bernstorff, the German ambassador, announced yesterday that an official communication from Berlin stated that German submarines had recently sunk 23 vessels, including four transports of the Allies, in the Mediterranean Sea. The ambassador received this message:

"During the last few weeks German submarines, operating in the Mediterranean, have sunk 23 vessels having an aggregate tonnage of 100,000. Of the vessels sunk four were transports of the Allies."

No statement was made as to the loss of life incident to the sinking of the various vessels.

In the last six weeks four British transports have been reported sunk in or close to the Mediterranean and a fifth in the Ægean Sea. In some instances there has not been any direct confirmation of these sinkings from London. During the same period several merchant vessels flying either the flags of Great Britain, France, or Russia have been reported sunk in the Mediterranean Sea. On September 24 the Overseas News Agency at Berlin sent a dispatch quoting Spanish newspapers as stating that German submarines had recently sunk a number of steamers belonging to the Allies.

On September 28 it was officially announced at Athens that the Greek Government had released the Sikhs and Gurkhas who were survivors of the British transport *Ramazan*. There had been no previous report of the sinking of the *Ramazan*. A Berlin dispatch the following day indicated the transport had been sunk in the Mediterranean.

Vienna reported on September 17 that an Austrian submarine had sunk a British transport in the Mediterranean district. On September 9 Berlin announced the British transport Southland had been sunk by a submarine in Turkish waters. On August 29 Berlin reported a submarine had sunk a British transport carrying Canadian troops near the Mediterranean.

On September 3 Berlin reported a British transport had been sunk, either by a submarine or mine, in the Ægean Sea and that 320 officers, 1250 soldiers, and a crew of 300 had been drowned. This was believed to have been the British transport *Royal Edward*, officially reported sunk on August 14 in the Ægean Sea with a heavy loss of life.—*N. Y. Times*, 19/10.

TORPEDO-BOAT NO. 96 LOST.—The British Admiralty announced that the British torpedo-boat *No. 96* was sunk at Gibraltar November 1 after being in a collision. She was an old boat.—*Army and Navy Journal*, 6/11.

ARMED MERCHANTMAN "TARA" TORPEDOED

LONDON, November 8.

Two German submarines attacked and sank the British armed merchantman *Tara* in the eastern Mediterranean last Friday, according to an official statement issued by the official press bureau to-day, reading as follows:

"On the fifth instant His Majesty's armed boarding steamer *Tara*, Capt. Rupert Gwatkin Williams, was attacked by two enemy submarines in the eastern Mediterranean and sunk. Thirty-four of the crew are reported missing."

Prior to the war the steamship *Tara*, of 6322 tons gross, was in the British-India Steam Navigation Company's service. She was built in 1902 and was 446 feet long, 53 feet beam and 29 feet deep.—*N. Y. Sun*, 9/11.

FRENCH AUXILIARY SHIP "INDIEN" TORPEDOED.—The Paris *Temps* on September 17 announced that the French auxiliary cruiser *Indien* of 800 tons, had been torpedoed and sunk on September 8, while at anchor off Rhodes, by a German submarine. Of the crew of 62, 12 are missing. The *Indien*, a vessel captured off Adalia two months before, sunk in about 60 feet of water, her funnel and masts being visible from the lighthouse of St. Nicholas.—*Army and Navy Gazette*, 25/9.

BLACK SEA

BULGARIA AND SEA POWER.—The news from Paris, of preparations for an immediate landing of Franco-British troops in Macedonia, and from Salonika, that Russian naval forces have already appeared off Varna, should be a convincing indication to Bulgaria that the Allied Powers are prepared to follow up the warning from Petrograd by prompt naval and military action if required. The first phase of any such action is bound to be naval in its character, and will afford a further demonstration of the value of sea power. The geographical position of Bulgaria makes her particularly vulnerable to attack from oversea. Moreover, the water communications to her coasts, both in the Ægean and the Black Sea, are at the present time, and will be, whatever happens, controlled by the fleets of the Allies. However formidable she may prove from a military point of view, her naval force is practically negligible, and would be quite unable to prevent a landing on her shores if such should be considered necessary. It seems probable, however, that for the purpose of sending assistance to Serbia, the railway to Belgrade from Salonika would be more convenient, provided the Greeks were agreeable to such a step.

The only harbor of importance which Bulgaria possesses in Macedonia is Dedeagatch, which has been several times visited by our ships since the operations began in the Dardanelles. This place, where the Bulgarians landed in the opening stages of the first Balkan War, is connected by rail both with Salonika and Constantinople through Adrianople. It might therefore, in certain eventualities, become necessary to occupy it, and it is unlikely that there would be any great difficulty in doing so.

It is, however, in the Black Sea that the Bulgarian coast presents many points on which a descent might be made with advantage. Neither Varna

nor Burgas have fortifications of a modern or formidable character, so far as is known, and little trouble should be found in disposing of the few torpedo craft. Our Russian Allies have asserted their mastery in the Black Sea in such a way that this should present no difficulty, and they have also organized sufficient tonnage for the transport of an expeditionary force. To place such a force on shore, or perhaps even to make a feint of doing so, should have the effect of detaining a large portion of the Bulgarian Army which might otherwise be placed on the frontier of Serbia. The potential threat of such an operation seems already to have been made.

The Bulgarian Navy is so insignificant that it cannot prove a serious factor against the warships of the Allies in the present war. From the latest official data the navy of Bulgaria consisted of one torpedo-gunboat, the *Nadiejda,* a vessel of 715 tons, built in 1898. She is sometimes used as a royal yacht, and has a speed of 17 knots. She is armed with two 4-inch, two 9-pounders and two 3-pounder guns, and has two torpedo-tubes above water. There are six torpedo-boats, built in 1907, which have a speed of 26 knots and are armed with two 3-pounders and have three 18-inch torpedo-tubes. They are each of 98 tons displacement. There are two old spar launches and seven other old launches. There is a vessel of 250 tons known as the *Kroum,* a paddle-wheel steamer with a speed of 8 knots, which is used also as a royal yacht. Three additional vessels, the *Kamtchia,* 125 tons; *Kaliavra,* 86 tons, and the cutter *Striela,* 25 tons, make up the rest of the Bulgarian Navy. The four latter vessels are not named in the official data as having any armament.—*Army and Navy Journal,* 30/10.

VARNA AND BURGAS SHELLED.—The French "wireless" official news issued by the Press Bureau contains the following:

Whilst British and French ships were bombarding the magazines, positions, and wharves of the port of Dedeagatch, the Russian fleet opened fire on Varna and Burgas, the two Bulgarian harbors of importance in the Black Sea.—*Naval and Military Record,* 27/10.

TREBIZOND BOMBARDED.—In addition to the appearance of Russian battleships and torpedo craft off the ports of Varna and Burgas, a Russian destroyer has been active near Trebizond, capturing a Turkish motor steamer and making an effective bombardment which caused two explosions.—*Naval and Military Record,* 13/10.

"GOEBEN" REAPPEARS.—On September 22, it was announced in a Petrograd communiqué that in the Black Sea near the Bosporus the Russian destroyers exchanged shots with the battle cruiser *Goeben.* Supplementing this, a Reuter telegram from Petrograd on September 26 said that the *Goeben,* in a recent appearance off the south coast of the Black Sea, 50 miles from the mouth of the Bosporus, cut off the retreat of a number of Russian torpedo craft. These escaped, thanks to skilful handling and the inaccuracy of the *Goeben's* fire.—*Army and Navy Gazette,* 2/10.

FLIGHT OF THE "HAMIDIEH"

RUSSIAN DESTROYERS' SMART WORK IN THE BLACK SEA

PETROGRAD, Monday.

In connection with the successful encounter between Russian torpedo-boat destroyers and the cruiser *Hamidieh* and two Turkish torpedo-boats, the following details have been obtained from an authoritative source:

It is known that the system of providing Constantinople with coal by means of a large number of sailing vessels has ended in a complete fiasco. The Germans and Turks are endeavoring to organize another system, and in this connection four large transports and one barque filled with coal were making for the Bosporus, convoyed by a detachment of naval vessels, including the *Hamidieh* and two of the older torpedo-boats.

In the early morning of Sunday the Russian destroyers *Pronsitedny* and *Bystry* met the enemy. In spite of the latter's enormous superiority the Russian boats attacked at once. The fight lasted three hours. After the *Hamidieh* had been struck several times causing, among other damage, the putting out of action of a 6-inch gun, the enemy fled towards the Bosporus. The *Pronsitedny* and *Bystry*, under the command of Captain Prince Troubetski, followed the enemy, keeping up a continuous fire.

When the enemy had rounded Cape Kefken and was approaching the Bosporus, our torpedo-boats returned towards the coal transports, which had remained near Zunguldak, and sank them, thus doing a useful piece of work.—*Press Association War Special, Naval and Military Record*, 8/9.

SEA OF MARMORA

TURKISH TRANSPORT IS SUNK BY BRITISH SUBMARINE

ATHENS, October 26 (via Paris).

A British submarine on Sunday sunk the Turkish transport *Carmen*, laden with munitions, in the Sea of Marmora.

The Austrian steamer *Carmen*, of 4424 tons, was tied up at Constantinople at the beginning of the war. It is probable that it was this steamer, converted into a Turkish transport, that the submarine sent to the bottom. She was built at Sunderland in 1911.—*N. Y. Times*, 27/10.

FRENCH SUBMARINE "TURQUOISE" LOST.—The Ministry of Marine in Paris announced on November 3 that the French submarine *Turquoise* had been sunk by gunfire in the Sea of Marmora. Two officers and 24 sailors were taken prisoners. The *Turquoise* was not one of the newest submarines in the French Navy, having been launched at Toulon in 1908. She had a length of 147 feet, with a beam of 13 feet and a depth of 12 feet. Her displacement was 390 tons, and she carried six torpedo-tubes.—*Army and Navy Gazette*, 6/11.

DARDANELLES

BRITISH DESTROYERS' IRON GRIP

THE DARDANELLES, September 26.

The outbreak of war soon showed that the destroyer was the only effective antidote to submarine attack, and, although by no means a perfect or ideal defence, destroyers are the best available, and they have performed immense services during the war.

The amount of work accomplished by the destroyer flotilla in the Eastern Mediterranean and at the Dardanelles has been stupendous, but their labors are little known to the public although fully recognized by the army and the navy. We are now in the 14th month of this world war, and our destroyers have worked almost without a break during the whole of this period. Their first job was to watch the Austrian fleet and to patrol the Adriatic and Eastern Mediterranean. But it was only when Turkey declared war that their most arduous task commenced. Throughout the winter months it fell to their lot to keep up an incessant patrol off the Dardanelles and along the Asiatic coast. Those months will never be forgotten by those who took part in these operations.

Storm-tossed and Tireless.—In all weathers, tossed about by terrible gales, with their decks never dry for weeks at a stretch, they kept up their incessant vigil on the straits, Asiatic coast, and neighboring islands. At times, issuing from under the lee of Tenedos, they would steam to the entrance of the straits in howling storms, which blotted everything from view a hundred yards away. Once in the mouth of the channel the four-knot current and east wind would sweep down with such force that they were only able to maintain their stations by steaming 10 knots ahead, such was the force of the combined elements.

Lying in the trough of the sea, these small craft would roll and plunge until even the most experienced seamen became sick from sheer exhaustion. The decks were continually swept by huge seas, no one on board could keep dry, and the galley fires could not be kept alight. The bitter cold frequently covered the decks and bridge with sheetings of ice and froze stiff the oilskins of the crew. Nevertheless, in spite of these awful conditions, the destroyer flotillas and their gallant crews never for a moment relaxed their grip on the Eastern Mediterranean and on the Dardanelles.

With the coming of the spring the material conditions improved with the return of fine weather and bright sunshine, but the work of the destroyers became even harder with the commencement of active operations against the Dardanelles.

On the day of the great attempt to force the straits, March 18, the destroyers played a secondary rôle in the actual fighting, but they did splendid work sweeping ahead of the battleships, and were responsible for saving the lives of the crews of the *Irresistible* and *Ocean*. They took the crews of the two ships off under a heavy fire, and were fortunate enough to escape any serious damage.

The Day of the Landing.—The next great service rendered by these craft was on the historic day of the landing, April 25. Each destroyer had a definite station assigned to her in the great drama at the different landings. Their rôle was to carry close inshore the second batch of infantry, who were to support the first landing parties. The destroyers were filled with troops at Mudros, and followed the landing and covering battleships to Helles and Gaba Tepe. No one will ever forget the sight at dawn as these long, low craft, packed with khaki figures, crept in closer and closer to the shore, coming under shrapnel and rifle and machine-gun fire, losing men before they could reach their objectives, but never hesitating, and only stopping to discharge their living cargoes into boats when the shallowing water prohibited a further advance. Throughout those early days the destroyers were kept incessantly busy, landing troops, covering exposed wings, and keeping guard up the straits.

A destroyer is a friend to every one in distress. She can move so quickly, and twist and turn so nimbly, that she is ever on the spot first to lend a helping hand. One day two of our transports lying locked together close to Y beach were suddenly opened on by a Turkish field battery. The steam-winch of one having been injured, she could not raise her anchor. Immediately a destroyer dashed to their assistance, placing her frail form between them and the enemy, and emitting great clouds of black smoke from her funnels to provide a screen against the gunners. At the same time she lowered a boat to pick up a panic-stricken member of the crew, who had leapt overboard. A tornado of shells ploughed up the sea all around her, and it seemed a miracle how she escaped. But there she remained, guarding the two transports until they could get underway and out of range.

Arrival of Enemy Submarines.—About the middle of May the work and responsibilities of our destroyers were increased to an incalculable extent by the arrival of the first of the enemy's submarines in the Eastern Mediterranean. Such a move had long been anticipated. The surprising part is the delay in their arrival, for had they been on the spot when we made our first landing they would have stopped the assistance the battleships were able to give to the first landing parties. At first the whole fleet did not retire to a protected harbor for cover, but the most valuable ships were sent away, and the older craft kept off the coast to protect the army's flanks.

It was the duty of the destroyer flotillas to guard these battleships and cruisers while engaged in this work. This is done by patrolling the sea in the immediate neighborhood of the battleships cruising round and round them, with the keenest eyes on the bridge, searching every yard

of water for the first suspicious ripple or the top of a periscope. At this time we had no other protection except that which the destroyers and certain of the trawlers, mounting 3-pounder guns, were able to give. Who will ever forget the excitement of those early submarine scares before all had become accustomed to them? Sometimes the scares were due to empty biscuit boxes floating in the water, sometimes to a log of driftwood, and, more often than not, to a dead horse floating just beneath the surface with one of its legs in the air after the manner of a periscope. There is the historic story of the young commander of a destroyer who reported to the admiral "that he had seen the most extraordinary submarine with no less that four periscopes, and that on his opening fire on it the enemy replied by using poisoned gas!"

Dodging the Foe.—Whenever one of these scares occurred every destroyer in the neighborhood dashed up at top speed in the direction indicated, endeavoring to ram her or to force her below by chasing her about. Meanwhile the battleships would up anchor together with the transports and commence a series of evolutions at top speed, dashing to all points of the compass, then rounding on their wakes, and going off in another direction. Really at times it looked as if every helmsman in the fleet had suddenly gone mad, for even in these short dashes from point to point the helms would be shifted every minute from port to starboard, or from starboard to port, so as to give the ship a zig-zag course, and put the enemy off his aim.

We had many of these exciting moments in those early days, but in spite of every precaution and the incessant vigilance of the destroyers it was impossible to save either the *Triumph* or the *Majestic*.

These disasters necessitated a change in our naval tactics. The battleships which had so long chaperoned the army had to seek shelter when they were not required to bombard the enemy's works, and when they came forth it was the destroyers who protected them against their unseen foe.

After this, for a period of nearly two months, the care of the narrow waters and the duty of protecting the transports and covering the flanks of the army fell on the destroyers. Excellent work was done by them during the big advance of our left wing on June 28-29, and at Anzac they have frequently tickled up the Turk most effectively, especially on his right flank.

In Full Cry.—The amount which fell to these craft during the summer was incalculable. I have never seen a destroyer at anchor anywhere for more than a few hours at a time. They remind you of a pack of hounds going through coverts when a submarine has been sighted or reported. Suddenly they break into full cry, with their muzzles glued to the ground, peering beneath the surface for the hidden foe. Then, after a long chase backwards and forwards, they force him to earth, and then sit down outside his lair to wait until he comes up again in search of a fresh victim. There is something peculiarly fascinating in watching these long, low, black craft at work. The way they can turn is amazing. A destroyer going at top speed will suddenly swing round in her own length, almost raising her bows out of the water, just like a racing automobilist who lifts his front wheels right off of the ground when turning a corner.

Here I must leave these wonderful craft, with their gallant crews and their record of splendid work. Their crews had a terrible time last winter, and now they are faced with the prospect of another five months blockade of the Dardanelles. When millions at home are comfortably sleeping in their warm beds, when hundreds of thousands of soldiers will be crouching in the trenches trying to obtain some warmth and shelter, our destroyers in the Eastern Mediterranean will be standing like sentinels before the mouth of the straits, washed by enormous seas, tossed to and fro like corks, encrusted with ice, and exposed to the full force of wind, rain, and snow—a horrible life, which only men of iron can stand.

But their crews will never fail us. They will never let go the iron grip they have obtained on the tottering Turkish Empire, and every time a shivering Turk looks over his parapet from Europe or Asia he will see these grim sentinels of fate.—*E. Ashmead-Bartlett, London Times,* 19/10.

BRITISH SHIPS IN DARDANELLES.—One of the most remarkable disclosures of the month has been that of Mr. Ashmead-Bartlett concerning the composition of Admiral de Robeck's force at the Dardanelles, which, in addition to a number of altogether new monitors, includes now a squadron of big cruisers of old types which have been adapted to resist torpedo and mine explosions. The *Endymion,* launched at Hull in 1891, and *Theseus,* launched at Blackwall in 1892, are stated to be two of these vessels. They are "protected by a formidable waistbelt similar to that worn by the monitors. . . . . It has not improved their appearance, for protection is hung from their sides by steel stanchions and wire ropes. They look as if they have just survived a terrible gale, in which most of their fittings had been washed away." In this manner, what Mr. Churchill called our "surplus ships" are being turned to excellent account in the war. Although the *Edgar* class, to which these ships belong, and the type of ship which was built in this yard, was used early in the war, it was withdrawn from service when more suitable vessels could be found for the patrol duties upon which it was employed. The *Hawke,* it will be remembered, was torpedoed and sunk, but if the remaining seven ships are at the Dardanelles they mean a useful addition to the fleet there of 14 9.2-inch and 66 6-inch guns, mounted on structures specially adapted to resist submarine attack.—*The Marine Engineer and Naval Architect,* November.

OPERATIONS IN THE DARDANELLES.—That the campaign of the Allies to capture the Dardanelles has failed thus far was officially admitted by Premier H. H. Asquith in Parliament on November 3. In a lengthy explanation of war operations Mr. Asquith, touching on the Dardanelles, went on to explain that the operations were considered absolutely necessary to prevent an attack on the Russians in the Caucasus and aid British defence of Egypt and Mesopotamia by keeping some 200,000 Turks busy on the Gallipoli Peninsula. He also stated that the operations were only undertaken after full consultation with naval experts, including the admiral on the spot—notwithstanding some doubts in the mind of Baron Fisher (then First Sea Lord). The operations were also approved by the French and the British War Council. "The view was," said Mr. Asquith, "that it would influence the Balkan situation, would open the way for supplies for the Russians and strike a blow at the heart of the Turkish Empire."

In further describing the details of the operations Mr. Asquith said, in part: "In the whole course of the war I have never sustained a keener disappointment than in the failure of these operations." Mr. Asquith pointed out that if the efforts to force the Dardanelles had been successful they would have been of immeasurable value. "They did not succeed," he said, "notwithstanding the magnificent exhibition and never surpassed gallantry of our troops. The situation in the Dardanelles is receiving the most anxious consideration of the government, not as an isolated thing, but as a part of the larger strategical question raised by reason of developments in the Balkans. There is a complete agreement between us and France both as to the end and the means in the Balkans."

A French official report of November 3, referring to operations of the Dardanelles, says: "The period from October 20 to November 1 has been marked with unusual calm. In the explosions of mines at various places we have had the advantage. The enemy appears to have given up renewal of the attacks against our lines, which, up to now, have caused him very heavy losses. In spite of the protecting nets and the many fixed mines set up by the Turks, British and French submarines have succeeded in

passing the Narrows and operating in unison in the Sea of Marmora, where they render particularly difficult the movement of Turkish boats and the revictualing by way of the sea of the Turkish troops on the peninsula."

The Turkish War Office on October 31 announced that a terrific bombardment by the Allies on the Gallipoli Peninsula had caved in certain trenches on the Turkish left wing. The official statement says a heavy bombardment by the enemy at other points, assisted by two monitors, accomplished no results. Later reports tell of unimportant local fighting, the destroying of some Allied trenches, and the hitting of an Allied transport, which was forced to withdraw, it is said.—*Army and Navy Journal*, 6/11.

THE WAR IN EUROPE.—General Sir Ian Hamilton, who was recently relieved of the command of the Dardanelles' expeditionary force, returned to London from the Dardanelles October 22. General Sir Charles Carmichael Monro, ordered to succeed General Hamilton in command of the operations on the Gallipoli Peninsula, has already arrived at the Dardanelles, it was officially announced in London on October 27.—*Army and Navy Journal*, 6/11.

THE NEW MONITORS.—The country is now beginning to reap some of the fruits of its unrivalled resources for shipbuilding and armaments manufacture. It is gradually being revealed how special vessels, built to supply needs unexpected before this war, have already been completed and commissioned. The manner in which these strange types are being shown at work in different parts of the world is amazing to those who were unaware of what has been going on all these months in our dockyards, both public and private. In an article published on October 20, Mr. Ashmead-Bartlett described the sensation caused when the new fleet of monitors made its appearance at the Dardanelles. The first of the new types, which arrived out there in July, was "unlike any other vessel ever seen in these parts, having a low freeboard, almost flush with the water, a 9.2-inch gun in her bows, and a long 6-inch astern. She looked more like a Chinese pagoda than a ship, but she talked like one all right, as the Turks found a few days later when she went out and tried a few shots at Asia for practice." Next there came out a small class of monitor, armed with two 6-inch guns, and finally the big ones which carry a pair of 14-inch guns each. The latter is evidently a queer type of ship to look at, and Mr. Bartlett describes the curiosity with which the first of the series was regarded when she wobbled into Kephalos harbor. The novelty in her hull appears to be the 10-foot bulges or "blisters" on her sides under the water-line, which are supposed to render her torpedo-proof. Further details of these unusual ships will be awaited with keen interest. Meantime, sufficient is known to justify a tribute to the architects, shipwrights, engineers, and in fact all concerned in their production, which was indeed a wonderful achievement in the middle of a great war. It was a mercy of Providence that the Admiralty had this fleet of monitors to fall back upon when the arrival of enemy submarines at the Dardanelles made the presence of the ordinary vessels of the navy in support of the troops there so hazardous.—*Marine Engineer and Naval Architect*, November.

THE "E-20" LOST IN THE DARDANELLES

LONDON, November 13.

An official statement given out to-day by the Admiralty announces that the British submarine *E-20* has been sunk by the Turks. The statement says:

"The British submarine *E-20* has been sunk in the Dardanelles. Nine members of her crew are prisoners."

An earlier announcement to-day said:

"Submarine *E-20*, which was on detached service in the Sea of Marmora, has not been communicated with since October 30, and it is feared she has been sunk. The enemy has announced that three of her officers and six men of the crew have been taken prisoners."

BERLIN, November 13 (by wireless to Sayville, L. I.).

A Turkish official report, dated November 12, announces the sinking in the Dardanelles on November 5 of the British submarine *E-20*, which is described as being an undersea boat of the most improved type. The statement reads:

"Owing to new measures of protection taken by the Turkish fleet, the British submarine *E-20* was sunk November 5 in the Dardanelles. Three officers and six sailors were made prisoners.

"The submarine was of the most modern type. She was of 800 tons displacement, and was armed with eight torpedo-tubes and two quick-firing guns."—*N. Y. Times*, 14/11.

"E-7" LOST.—The Secretary of the Admiralty, on September 16, made the following announcement:

"The enemy claims to have sunk submarine *E-7* (Lieut. Commander Archibald D. Cochrane, R. N.), off the Dardanelles, and to have taken three officers and 25 men of the crew prisoners.

As no news has been received from this submarine since September 4, it must be presumed that this report is correct.

E-7 was employed at the outbreak of the war on scouting work in the Heligoland Bight, and was then commanded by Lieut. Commander F. E. B. Feilmann. Lieut. Commander Cochrane, who was mentioned in dispatches for similar service in *D-1*, took command of *E-7* on November 16, 1914, and has done good service in her in the Sea of Marmora, where in July he bombarded the railway near Kara Burnu and destroyed a military train, for which exploit he received the D. S. O. only three days before the loss was reported. Including the Australian boats, this is the sixth British submarine of the *E* class officially reported lost. The Secretary of the Admiralty, on September 20, announced Lieut. Commander Cochrane as a prisoner of war. The enemy claimed to have taken three officers and 25 men of the crew prisoners, and the other two officers announced on the 20th as prisoners of war were Lieutenant John A. H. Scaife, R. N., and Acting Lieutenant Irvine M. Twyman, R. N. R.—*The Army and Navy Gazette*, 25/9.

A bomb from a Taube aeroplane went clear through three decks of a British light cruiser in Suvla Bay, on the Gallipoli Peninsula, killing 145 officers and men, some seven weeks ago, according to Eric Wilson, an English marine engineer, who arrived in this country on the White Star liner *Adriatic* on October 29. Mr. Wilson was employed on the former liner *Suevic*, which had been transport *A-29* and afterward became hospital ship *Z-56*. He said he saw the incident to which he referred.—*Army and Navy Journal*, 13/11.

Announcement was made October 30 by the British Admiralty of the loss during the night of October 28-29 of H. M. S. *Hythe*, an auxiliary sweeper, Lieut. Commander Arthur Bird, which was sunk after being in collision with another of His Majesty's ships off the Gallipoli Peninsula. She had on board about 250 men in addition to her crew. The number lost was: One warrant officer and nine men; military, two officers and 143 men.—*Army and Navy Journal*, 6/11.

SWEEPER SUNK.—During the night of the 28th-29th ult., the *Hythe*, auxiliary sweeper, Lieut. Commander Arthur H. Bird, R. N. R., was sunk after being in collision with another ship off the Gallipoli Peninsula. At the time of the collision she had on board 250 men, in addition to her crew, and subsequently the Admiralty gave the following numbers missing: One warrant officer, nine men; military, two officers, 143 men. Lloyd's Register gives one steamer of the name of *Hythe*, belonging to the South-Eastern Railway Company. This vessel, of 509 tons, was built at Dumbarton in 1905.—*Army and Navy Gazette*, 6/11.

LONDON, Saturday.

The Secretary of the Admiralty announces:

During the night of October 28-29, H. M. S. *Hythe*, auxiliary sweeper (Lieut. Commander Arthur H. Bird, R. N. R.), was sunk after being in collision with another of His Majesty's ships off the Gallipoli Peninsula.

At the time of the collision she had on board about 250 men in addition to her crew.

Later information gives the following numbers as missing:

Crew—One warrant officer; 9 men.

Military—2 officers; 143 men.

—*Naval and Military Record*, 3/11.

SUBMARINE OFFICER'S FEAT.—The only official news of a naval character connected with the campaign in the Gallipoli Peninsula this week is that relating to the gallant achievement of Lieutenant Guy D'Oyly Hughes, R. N., who has been awarded the D. S. O. He had already received the D. S. C. on June 25 for service in the Sea of Marmora in *E-11*, Commander Nasmith's boat, of which he is second in command. The Admiralty, on October 8, issued an extract from the official report of the commanding officer of the British submarine describing Lieutenant D'Oyly Hughes' enterprise, from which the following is taken:

"Lieutenant D'Oyly Hughes, R. N., having volunteered to make an attempt on the railway, proceeded to a spot some 60 yards on the port bow of the boat. His weapons consisted of an automatic service revolver and a sharpened bayonet. He also carried an electric torch and a whistle. He swam along the coast till a less precipitous spot was reached. Here, after a stiff climb, he arrived at the top, and half an hour later, after a considerable advance, reached the railway line. Having advanced some 500 yards or 600 yards, voices were heard ahead, and shortly afterwards three men were observed sitting by the side of the line talking quite loudly. After watching them for some time, he decided to leave the charge, which was very heavy and cumbersome, and go forward, making a wide detour inland, to inspect the viaduct. From a distance of about 300 yards the viaduct could easily be seen, as there was a fire burning at the near end of it. A stationary engine could be heard on or just beyond the viaduct, and men were moving about incessantly. He decided that it was impossible to destroy the viaduct, so he returned to the demolition charge and looked for a convenient spot to blow up the line. He found a low brickwork support over a small hollow and placed it underneath. Unfortunately it was not more than 150 yards from the three men sitting by the line, but there was no other spot where so much damage could be done. He muffled the fuse pistol as tightly as possible with a piece of rag, but the noise was very loud on such a still night, and the men heard it and instantly stood up. They came running down the line, so a hasty retreat was made. In view of the fact that speed was necessary, Lieutenant D'Oyly Hughes decided that to return down the cliffs at the place of ascent was impossible, so he followed the railway line to the eastward for about a mile till he came close to the shore. He plunged into the water about three-

quarters of a mile to the eastward of the small bay in which the boat was lying. The charge exploded as he entered the water, fragments falling into the sea near the boat. After swimming for 400 or 500 yards straight out to sea, he blew a long blast on his whistle, but the boat, being in a small bay behind the cliffs, did not hear it. After swimming back to the shore and resting, he commenced swimming towards the bay in which the boat was lying. At this point he discarded his pistol, bayonet, and electric torch, their weight making his progress very slow. It was not until he had rounded the last point that the whistle was heard, and at the same time he heard shouts from the cliffs overhead, and rifle fire was opened on the boat. We picked him up in an extremely exhausted condition about 40 yards from the rocks, after he had swum the best part of a mile in his clothes."—*Army and Navy Gazette*, 16/10.

It has also been reported that a light British squadron has been firing at the Turkish positions at Frenki. According to a dispatch from Mitylene, "the Allies have placed long-range naval guns on specially built barges and bombarded the ports on both sides of the straits."—*Naval and Military Record*, 13/10.

PACIFIC

GULF OF PERSIA

THE ADVANCE ON BAGDAD.—There is complaint in England that the Mesopotamian campaign is being neglected in the news reports. Several famous regiments of British regulars are engaged in it, together with East Indian troops, marines and a naval contingent, under the command of a distinguished cavalry officer, Sir John Nixon, but almost nothing is heard of their exploits. Yet it has been a campaign of uniform success under great natural difficulties. Its objective is the ancient city of Bagdad, immortally associated with Harun-al-Rashid and the "Arabian Nights." A fortnight ago the expedition was only 90 miles away, after a brilliant victory over the Turks. The insufficient reason for the dearth of information about this picturesque campaign is that the Indian Government is conducting it. The home authorities therefore give it scant attention, disregarding its appeal to the imagination, oblivious of the interest that friends in England feel in the British troops employed.

Sir John Nixon's first success was the capture of the strategic port of Basra on the Persian Gulf, which will be the terminus of the Bagdad railway connecting the Bosporus with the gulf, "the short cut to India." The expedition then fought its way through the swamps and shallow lakes of the lower Euphrates to the junction of that river with the Tigris. There a base was established. It has been said that "the advance which ended in the battle of Nasiriyeh involved greater difficulties than those experienced by the late Lord Wolseley in the earliest efforts to reach Khartum." A force was detached to guard the Admiralty pipe line at Ahwaz in Persia from tribal attacks. A very practical campaign this of Sir John Nixon's.

Once established in Bagdad, and there is no reason to doubt the capture of the old capital of the Mohammedan world, the British campaign will be consummated. One of the most fertile regions of the Ottoman Empire, 400 miles by nearly 200 miles, will have been conquered. It is a very long and a rough road to Constantinople, and the expeditionary force is not strong enough to fight its way through. If the Allies prevail in the war, England, in possession of Bagdad and the lower valleys of the Tigris and Euphrates, will control the great railway the Germans coveted and the country occupied will be claimed. There may be reasons for reticence in London about the campaign in Mesopotamia. Politically it is of prime importance.—*N. Y. Sun*, 11/10.

ON THE ROAD TO

On Wednesday it was announced in the House of Commons that the British Expe neighborhood of Kut-el-Amara. The Turks guarding the road to Bagdad athwart the ri retreat on Bagdad, a hundred miles away. The last news of the British forces in th

N THE ROAD TO BAGDAD

e British Expeditionary Forces, which reached Amara on the Tigris in June, were now in the athwart the river in advance of Kut-el-Amara have been heavily defeated and are in full h forces in the Euphrates Valley was that they had taken Nasiriyeh, 100 miles from Basra.

—*London Times*, 1/10.

THE WRECKING OF THE CRUISER "EMDEN" BY SHELL FIRE.—It is not often that the world has an opportunity to judge for itself of the terrific destruction wrought by accurate shell fire in a modern naval engagement; certainly, we have never presented in these columns an after-the-battle photograph of the beaten warship, which showed in such dramatic fashion the frightful execution which well-directed shell fire can do upon the hull, decks and superstructure of a light cruiser. The *Emden*, it will be remembered, was the most successful of those fast German cruisers, which, in the earlier months of the war, preyed successfully upon the merchant shipping of the Allies. Her displacement was 3600 tons and her best speed, 24½ to 25 knots; although it must be remembered that, due to her long cruise at sea, her bottom when she fought her last engagement was foul and her speed therefore was considerably reduced. She was protected with a 2-inch deck amidships and carried an armament of ten 4.1-inch guns. While she was engaged in raiding a British wireless station on an island in the Indian Ocean, the Australian cruiser *Sidney*, warned by the wireless operators before the Germans had a chance to destroy the plant, had rushed at full speed to intersect and engage the German ship. The *Sidney* is a light cruiser of 5200 tons displacement and 26 knots speed, mounting a battery of eight 6-inch guns.

The *Sidney* at the time she received the call for assistance, formed part of the convoy for a contingent of the transports carrying Australian troops to the Dardanelles and Egypt. As she approached the island her smoke was discovered by the *Emden*, which immediately steamed out into the open, not even waiting to pick up a large landing party that had been sent ashore. This party, by the way, subsequently seized a schooner, made its way over to the Arabian coast, and finally turned up in Constantinople after a series of adventures which for romantic daring the most imaginative novelist would find it hard to equal. The *Emden* concentrated a very accurate fire on the *Sidney* during the early stages of the engagement, but the *Sidney*, taking advantage of her superior speed and the greater ranging power of her guns chose to fight a long-range action, during the course of which she cut the German cruiser to pieces and fairly decimated her crew. Captain Muller, of the *Emden*, realizing that his ship was done for, headed for an island and beached the *Emden* and only hauled down his flag after he had received further broadsides from the *Sidney*.

The photographs of the wrecked vessel speak for themselves and testify to the hurricane of high-explosive shells which found and searched out the doomed vessel. They show what the 100-pound shell can do, when it is directed against unarmored plating. Judging from the multi-perforated condition of such structures as the bridge, the fragmentation of the shells must have been perfect, and it is marvelous that any of the officers and crew escaped. Moreover, whenever the shells burst in confined spaces, the pressure of the trintrotolnol gases was sufficient to burst the whole structure open, as will be noted in more than one of the photographs.

The victory of the *Sidney* naturally aroused great enthusiasm in the young Australian Navy, and a wrecking crew is being dispatched to raise the *Emden* and bring her to Australia as a notable trophy of war.—*Scientific American*, 30/10.

OCCUPATION OF SAMOA.—A White Paper (Cd. 7972) was issued on September 14 containing correspondence relating to the occupation of German Samoa by a force from New Zealand. In a telegram sent to the Governor of New Zealand, on August 6, Mr. Harcourt explained that any territory occupied must be at the disposal of the Imperial Government at the conclusion of the war for the purpose of an ultimate settlement. The rear admiral commanding the Australian squadron in summoning the German governor to surrender, informed the latter that an overwhelming force

The Wrecking of the Cruiser Emden by Shell Fire

Superstructure and Fallen Smokestack

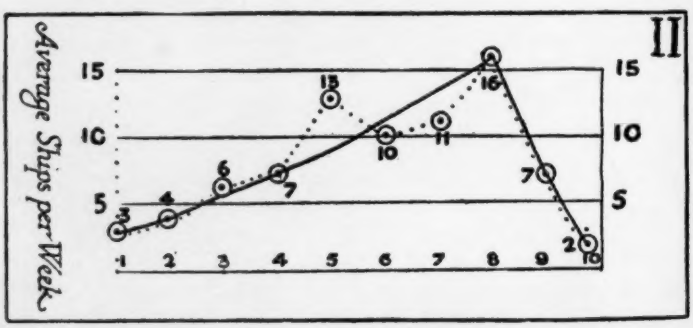
Wreck of the Bridge

Shell-Torn Deck and Smokestacks

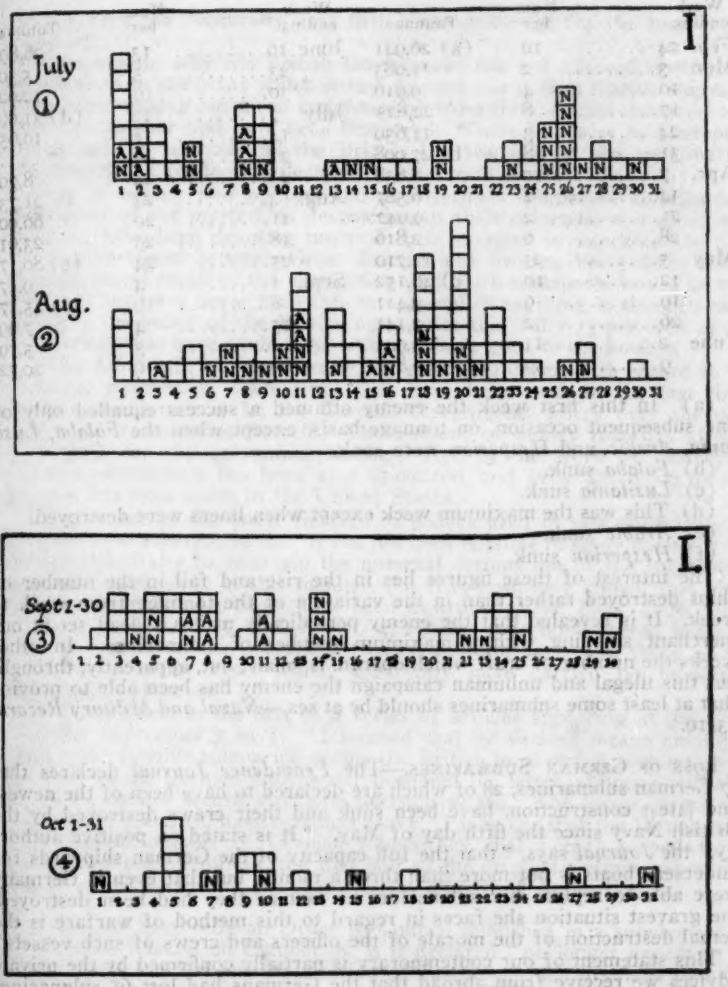
was off the port of Apia, and that, in order to avoid unnecessary bloodshed, fire would not be opened in the event of an immediate surrender. The rear admiral reported to the Admiralty on August 30 that he had taken possession of Apia. "In reply to my summons to surrender," the admiral stated, "the acting governor, in the absence of the governor, stated that he submitted to the occupation of the island. I carried out extensive sweeping operations before entering the harbor, but found no mines. No resistance was offered. There have been no enemy ships in the harbor for some time. The landing of troops was commenced during the afternoon, and the British flag was hoisted."—*Army and Navy Gazette*, 25/9.

MISCELLANEOUS

LOSSES OF THE MERCHANT NAVY.—In the House of Commons Dr. Macnamara, on behalf of the Admiralty, has given some particulars of the losses which the merchant navy has sustained owing to the enemy's operations at sea. He stated that the number of British merchant ships, exclusive of fishing vessels, which had been sunk by submarines was 183, and of these 93 had been destroyed by torpedoes. In addition, 175 British fishing vessels had been sunk. Studied in relation to the size of the British Merchant Navy, the relatively small loss which has been suffered is apparent. When the war broke out we possessed 11,028 ships, both steam and sail, but mainly steam—equivalent to over 40 per cent of the world's shipping. Owing to the strangulation of German shipping, which removed from the seas nearly 2400 vessels and the withdrawal of the vessels of Austria-Hungary, numbering 445, the proportionate strength of the British Merchant Navy was increased. It is a matter of surprise not that we have lost 183 ships, but that we have not lost ten times as many. The enemy's failure is directly traceable to the rapidity with which the navy grasped the necessities of the new situation and devised new methods of defence.—*Naval and Military Record*, 27/10.



THE WEEKLY AVERAGE OF SHIPS TORPEDOED AND MINED SINCE THE ATTACKS ON MERCHANTMEN COMMENCED IN THE LAST WEEK OF JANUARY, 1915. THE MEAN IS TAKEN OF EACH GROUP OF FOUR WEEKS UP TO AND INCLUDING OCTOBER 10. THE LAST IS THE MEAN OF THREE WEEKS
—*Land and Water*, 6/11.



SHIPS BRITISH, NEUTRAL (N), AND ALLIED (A), TORPEDOED AND MINED IN HOME WATERS IN THE MONTHS OF JULY (49), AUGUST (66), SEPTEMBER (40), AND OCTOBER (16)

—*Land and Water*, 6/11.

The Manchester Guardian has published a most interesting chart showing the results of the submarine blockade week by week from its commencement at the beginning of February down to the end of September. It is based on the figures published by the British Admiralty in its weekly returns. Space does not permit the reproduction of the chart, but the figures which accompany it as to the number of ships destroyed and their tonnage, based, as has been stated, on the Admiralty figures, deserve attention.

Week ending	Number	Tonnage	Week ending	Number	Tonnage
Feb. 24.....	10	(a) 26,941	June 16.....	13	26,894
Mar. 3.....	2	1,983	23.....	5	5,501
10.....	4	9,916	30.....	19	12,923
17.....	8	22,825	July 7.....	10	(d) 31,068
24.....	3	11,630	14.....	11	10,651
31.....	8	(b) 27,008	21.....	—	.....
Apr. 7.....	10	8,838	23.....	24	8,793
14.....	2	6,587	Aug. 4.....	21	21,733
21.....	2	9,942	11.....	20	66,905
28.....	6	2,816	18.....	23	23,617
May 5.....	23	14,710	25.....	24	(e) 80,175
12.....	10	(c) 48,152	Sept. 1.....	4	9,179
19.....	9	9,411	8.....	16	(f) 45,174
26.....	2	2,141	15.....	4	7,998
June 2.....	11	23,943	22.....	3	5,791
9.....	39	20,856	29.....	6	20,727

(a) In this first week the enemy attained a success equalled only on one subsequent occasion, on tonnage basis, except when the *Falaba, Lusitania, Arabic,* and *Hesperian* were sunk.
(b) *Falaba* sunk.
(c) *Lusitania* sunk.
(d) This was the maximum week except when liners were destroyed.
(e) *Arabic* sunk.
(f) *Hesperian* sunk.

The interest of these figures lies in the rise and fall in the number of ships destroyed rather than in the variation of the tonnage from week to week. It is revealed that the enemy periodically makes a dead set at our merchant shipping with a maximum number of submarines. In other weeks the number of craft which operate is small; but, apparently, throughout this illegal and unhuman campaign the enemy has been able to provide that at least some submarines should be at sea.—*Naval and Military Record*, 13/10.

LOSS OF GERMAN SUBMARINES.—The *Providence Journal* declares that 67 German submarines, 28 of which are declared to have been of the newest and latest construction, have been sunk and their crews destroyed by the British Navy since the fifth day of May. "It is stated on positive authority," the *Journal* says, "that the full capacity of the German shipyards for underseas boats is not more than three a month, but that even if Germany were able to replace her submarines as fast as they had been destroyed, the gravest situation she faces in regard to this method of warfare is the actual destruction of the morale of the officers and crews of such vessels."

This statement of our contemporary is partially confirmed by the private advices we receive from abroad that the Germans had lost 61 submarines up to a recent date, but we cannot figure out how the Germans could have got submarines enough to lose this number and have any left. The Providence paper accompanies its statement of the number of submarines lost with an elaborate description of the supposed method of their destruction by the use of floating wire netting. If netting has been used, as would appear to be the case, it can hardly have been used in the method described by the *Journal*, which says:

"There has never been any lane of wire netting to protect transports. British authorities have not been diverted from their course against the German submarines by reason of any activity that has been displayed outside of the several zones which they have been protecting. The loss of the *Lusitania* was a great blow, as was the destruction of the *Arabic*, but the large majority of the vessels which have been sunk by German submarines

have caused the Admiralty very little concern except for the loss of life involved.

"The reason why the British Government has not allowed itself to be diverted from the plans which it had mapped out is that British shipyards have been turning out more freighters of from three to five thousand tons than the number that have been destroyed. There has been no attempt to safeguard the seas around the British Isles outside of the well marked localities that have been under guard for several months.

"Up to within two months ago the German submarine commanders, regardless of the mysterious destruction of their comrades and other submarines, have been devoting most of their energies to attacking the lines of transportation between Great Britain and France, being fully aware that the moral result of the destruction of British transports would be very great. They have never been able to accomplish anything in this direction, and it is the belief of the British authorities that fully 75 per cent of the submarines that have made these attempts have gone to the bottom.

"The Admiralty has never made any public statement with regard to the immense number of submarines that have been sunk in the last three months, preferring to let the German Government worry over the non-return of its undersea vessels. The amount of money that has already been paid for the galvanized nettings used in the work of destroying German submarines has been over $7,000,000, and fully $2,000,000 of this amount has been spent in the United States.

"The range of the latest German torpedoes used in new submarines is between 1100 and 1200 yards. It has not been possible in many cases for the British Admiralty to ascertain the numeral designation of the submarines that have been sunk in this manner, but it is positively known that since April 1 the following boats have been destroyed: *U-9, U-15, U-16, U-18, U-22, U-23, U-24, U-5, U-2, U-7, U-4,* besides four unnumbered boats of what is known as the *Augsburg* two-cycle motor type, and three of the *Nuremburg* motor type, which apparently have carried no numerical designation whatever."

M. René Bazin in the first of a series of articles appearing in the *Echo de Paris* September 7 says: "I learned that by various means employed against the terrible submarine enemy the British have struck such a powerful blow at the German underwater fleet that the latter, although still able to annoy, cannot secure a definite decision at sea. The losses, which are not generally known, have been too heavy. I may say that the British have sunk a great number of German submarines, that French torpedo-boats have accounted for others, and that half of the original German submarine fleet is at the bottom of the sea."—*Army and Navy Journal*, 25/9.

FLAGS NO SIGN.—By an Order in Council published in a supplement to the *London* Gazette on October 25, it is declared "no longer expedient to adopt" Article 57 of the Declaration of London, which provides that the neutral or enemy character of a vessel is determined by the flag which she is entitled to fly. Consequently the article ceases to be in force, and in its place British Prize Courts are to apply the rules and principles which they formerly observed.—*Army and Navy Gazette*, 30/10.

GERMAN SUBMARINES.—The Germans are not willing to admit that they have lost so large a number of their submarines as has been claimed, urging that all the statements concerning their losses come from English sources. Assuming that Brassey's *Naval Annual*, War Edition of 1915, was correct in giving the number of German submarines ready at that time as 39, and that the estimate that the Germans have been able to build three a month is correct, this would give a total up to the first of October of 81. Deducting the 67 alleged to have been lost, only 14 German submarines would be left. Newspaper reports indicate, German authorities claim, that

they have at least five submarines in the Mediterranean, the Dardanelles, and the Black Sea, and some are supposed to be stationed in the Baltic while others are active in British waters and off the Norwegian coast, making a total of more than 14. The facts published in the *Army and Navy Journal*, confirmed by the statements of the German Admiralty in connection with the *Arabic* case, indicate that the submarines are usually away from their bases about a fortnight for overhauling and re-provisioning, and this would require a considerably greater number than nine submarines to do the scouting, patrolling and defending work in the Baltic, in the different parts of the North Sea and in the Atlantic and to give the necessary relief.

These statements are made in reply to a newspaper report that 67 submarines had been destroyed between May 5 and September 23, the day on which the report was printed, and it is pointed out that this would mean the destruction of one German submarine every second day. It has never been the contention of the *Army and Navy Journal* that that statement of 67 lost in less than five months was true, and we see nothing in the German claims to contradict our estimate of the loss of 50 submarines at the time our statement to that effect was made.

It is further denied by the Germans that the submarine warfare has any injurious effect on the morals of officers and crews of submarine vessels. "I know from German papers," says a well informed German, "as well as from private letters, that the German submarine warfare is most popular in Germany; that not only the navy, but the whole nation is proud of the enterprise, courage and perseverance shown by its officers and crews, and of the reliability and the seaworthiness of its material. The actual result is that, notwithstanding the undoubted hardship connected with submarine warfare, there is always an abundance of officers and men in the German Navy applying for being enlisted into the much coveted branch, and the morale of the undersea craft crews, at least in German judgment, could not be better than it actually is. In fact, the Germans think that there is no limit to the enterprise of their submarine constructors and their commanding officers. German submarines have been seen at and they have worked, not only off the Irish coast, but also off the River Gironde, deep in the Bay of Biscay and even off Algiers. Many people in Germany think that the day is not far off when German submarines will begin to menace the Atlantic trade to England on places much further off from their bases than was the case until now." The Germans scoff at the description of the methods alleged to have been employed in the destruction of their submarines. They cannot understand how a mine can be constructed which would explode when touched by the hull of a submarine and not by the hull of any other vessel. A doubt is expressed, too, as to the fast motor boats.

The question of the efficiency or inefficiency of the submarines is very important from a professional point of view, and we think it proper therefore to give the German claims in regard to the alleged inefficiency of their submarine warfare. It is difficult to see how any certain information concerning it can be obtained until the war is over. The latest information we have from any German source is found in "Taschenbuch der Kriegsflotten, 1914-15 Kriegsausgabe," which gives the number of German submarines in commission at the opening of the war as 28, with others building. Owing to the secrecy shown by the Germans in this matter, Brassey's estimate of the number of German submarines at the commencement of the war cannot be accepted as conclusive.—*Army and Navy Journal*, 16/10.

GERMAN SUBMARINES AND NEUTRAL SHIPS.—With reference to a statement which has appeared in Norwegian newspapers that German submarines, in order to avoid responsibility, show neither flag nor number when sinking neutral vessels, a semi-official telegram from Berlin states that German submarines fly the German war flag when engaged in any act

of war as well as when "sinking or searching neutral ships." It is admitted that the numbers of submarines have been removed for military reasons.—*Army and Navy Gazeette*, 25/9.

THE DIRECTION OF THE WAR.—War produces great changes. Since it opened we have had two First Lords of the Admiralty and two Secretaries of State for War, and there have been three First Sea Lords, while at the War Office the Chief of the Imperial General Staff has been changed and other variations have been made. One government has fallen by its own act, to be succeeded by another, which is now undergoing active criticism and rigorous reform. On the other side of the channel there have also been changes. Admiral Boué de Lapeyrère has relinquished the chief command afloat, and now a new French Government has come into office. The French people are adapting themselves to war conditions; that is the significance of the formation of the new administration. It will have the support of all parties, and it will have the advantage of two ministers in charge of the army and navy respectively who know what war means. General Galliéni has gained a great reputation in various colonial wars. For some time past he has been active as Military Governor of Paris, and he has now taken over the military administration, with all the advantage of full knowledge of what has already happened since the war opened. The new Minister of Marine (Admiral Marie Juan Lucien Lacaze) is also a man of distinguished parts. He is only 55 years of age, and from the time of his first entry into the naval service he has been associated with men who count. One of his last appointments as a captain was as chief of staff to Admiral Germanet, when that officer was commander-in-chief in the Mediterranean. During the two years that M. Delcassé was at the Ministry of Marine—years of vigorous naval progress—Admiral Lacaze acted as Chef de Cabinet. The French Navy is to be congratulated upon having so comparatively young, so experienced, and so able a naval officer placed at the head of its affairs.—*Naval and Military Record*, 3/11.

The full personnel of the new war committee of the British Cabinet was announced by Premier Asquith on November 10. The committee will consist of: Premier Asquith, First Lord of the Admiralty Balfour, Colonial Secretary Bonar Law, Chancellor of the Exchequer McKenna and Munitions Minister Lloyd George. Foreign Minister Sir Edward Grey, though not a member of the council, will sit with it when its deliberations relate to affairs of his department.

Premier Asquith on November 10 asked the House of Commons to vote a credit of £400,000,000 ($2,000,000,000). The Premier said that of the total governmental expenditures of £743,000,000 ($3,715,000,000) from April 1 to November 6 £17,300,000 ($86,500,000) had been used for munitions for the army and navy, £98,300,000 ($491,500,000) for loans to the Allies and the remainder for miscellaneous purposes. The expenditures were increasing, he said. The government had on hand £113,500,000 ($567,500,000), which was estimated to be sufficient to complete the present month. Up to September 12 the war had cost an average of £4,350,000 ($21,750,000) a day.—*Army and Navy Journal*, 13/11.

THE BRITISH LOSSES.—Mr. Asquith, in reply to Mr. Molteno, has furnished the following figures of the total casualties in the Western Area of operations up to October 9, and of the total casualties in all fields of operation:

WESTERN AREA

	Officers	Other ranks
Killed	4,401	63,059
Wounded	9,169	225,716
Missing	1,567	61,134

Total casualties Western Area, 365,046.

IN ALL FIELDS OF OPERATION

	Officers	Other ranks
Killed	6,660	94,992
Wounded	12,633	304,832
Missing	2,000	72,177

Total casualties in all fields of operation, 493,294.

It will be seen that of the total casualties in all fields of operation, 21,293 were among officers and 472,001 among the men.

Since the War Office began last month to issue long lists of casualties presumably referring to the fighting which began with the British advance on September 25, the officers' losses recorded on the Western Front have numbered 2958, and those in the ranks 45,288.—*Army and Navy Gazette*, 6/11.

AN EFFECTIVE CONTRAST.—The Foreign Office will be able to make effective use of the reports which it will presumably receive in due course from the Russian Admiralty of the successes of the submarines in the Baltic. Sir Edward Grey will receive very shortly another note from President Wilson dealing with the measures which have been taken to intercept the enemy's trade. The complaint of American traders hitherto has been that these measures have not been impartially applied. They admit that ships are held up in passing across the North Sea, but they have complained that the Scandinavian countries have been able to continue their trade with Germany. It can no longer be said that the navy is not stopping enemy ships in the Baltic. The siege of Germany is complete, and the Foreign Office has been supplied by the commanders of the British and Russian submarines with a splendid case. An effective comparison may be drawn between the results of our "blockade" measures and those which followed from the blockade adopted by the Americans during the Civil War. During that struggle, as we have been reminded, this country suffered seriously. The Lancashire cotton trade was paralyzed to the extent of £40,000,000 annually, and famine occurred, entailing terrible hardships; the number of paupers was increased by 90,000, and a million sterling had to be spent in relief during the two years that the distressing conditions prevailed. The present war is no struggle between two sections of a nation, but between 11 European nations—including some of the best customers of the United States. The war saved America from a commercial "slump." It had already begun in June and July of last year, and the war checked the movement. Trade has since revived. The prosperity which all classes in the United States are enjoying is directly due to the efficiency and sufficiency of the British fleet. Had the command of the sea been in dispute, America could have traded only at enormous risk with any one of the 11 belligerents. As it is, she is shut off from only the Central Powers and their allies. That on the one hand. But that is not all. Owing to our successful sea power she has developed an enormous trade with the other seven nations. When Americans fought, thousands of our fellow-countrymen were forced to starve; and now, when the Old World is in the crucible, the very war, owing to the conditions at sea created by us, first saved the United States from a trade "slump" and then heralded a period of increasing prosperity.—*Naval and Military Record*, 3/11.

NAVAL PUBLICATIONS

BOOK REVIEWS

"Marine and Stationary Diesel Engines." By A. H. Goldingham. xx + 206 pages, eight diagrams, ten folding plates, and 104 illustrations. (New York, Spon & Chamberlain. London, E. & F. N. Spon, Ltd.).

A handy book for students and engineers, covering the theory of operation of the Diesel engine with clear explanations of the actions that take place in the cylinder and of the valve action in relation to that of the piston for both two-cycle and four-cycle types. Details of construction are fully covered accompanied by clear illustrations and numerous formulæ. A short chapter is devoted to indicator diagrams with brief explanations. The advantages and disadvantages of this type of engine are recorded, followed by a chapter on operation and correction. One hundred and seventeen pages are devoted to various types of Diesel engines. These pages include full description of types with dimensions and test data, and are comprehensive in explanations and copiously illustrated. Tables are appended giving results of tests, characteristics of several mixtures of Mexican crude and gas oils, and names of ships in which Diesel engines are installed, with dimensions and power of engines.

This book covers fully desirable available information of the Diesel engine, and should be of theoretical and practical value to anyone seeking information in regard to this type. It is printed clearly and the text is elucidated by a great number of very useful illustrations.

G. J. MEYERS.

"Instructions For Designing, Making and Operating High Pressure Transformers." By F. E. Austin.

The author has added one more to his handy little volumes on electrical subjects; this time in the line of high potential work. The development of radio telegraphy and telephony has opened up a new and constantly increasing field for simple high tension transformers, and this booklet will be of assistance to all who are unable to buy the completed apparatus as well as to those who desire a knowledge of the elementary design of this class of device. The amateur would do well to stick close to Professor Austin's design and above all else should appreciate the danger of handling the finished product. Familiarity in handling high potentials often leads to dangers not only to the operator but to others.

This manual will be of much interest and help to the home builder of apparatus, and is a handy volume for any one desiring to get into touch with high pressure transformer work.

H. G. K.

"Examples in Alternating Currents." Vol. I. By F. E. Austin.

As stated in the title, this book is not in itself a text-book, but is to be used in conjunction with text-books, and is particularly suitable for persons taking correspondence courses in Electrical Engineering. It embodies a very broad range of problems in alternating current electricity and thoroughly covers the field of at least the first principles in this type of work. As in many books of this type the author has embodied sections devoted to elementary geometry, trigonometry and calculus. From some points of view it seems that this space might be better utilized, if the essential part of geometry, trigonometry and calculus were limited to tabulated formulas. In particular, tabulations of trigonometrical formulas and the commoner ones of differential and integral calculus are always useful.

One simple point that impresses the student of the average American text-book is the use of the word *pressure,* instead of *electro-motive force,* throughout the book. This is certainly to be commended, and were the pressure idea thoroughly driven home upon all students at the start of their studies, much quicker comprehension of electrical phenomena would result. In fact, the analogy between hydraulics and electricity can well be embodied in elementary electrical works.

In the main body of the book, that is the part devoted to the statement and solution of problems, the method followed is quite novel and has many excellent features. By boldly stating the problem, then tabulating the data, and then indicating a mathematical solution, many questions arising in the student's mind are answered. The addition of similar problems unsolved then gives the student an opportunity to exercise his own ingenuity. The only danger in this method of procedure is the fact that the student may overlook the units in which the data is given and subsequently fall down on similar problems differently stated and in different units. Even this, however, is good practice, and where the answer is stated the correct result should ultimately be obtained.

It is certain that facility in handling problems involving alternating currents comes only from the solution of problems, so that this volume of *"examples in alternating currents"* will surely prove of assistance to all students of the subject, and particularly to those pursuing correspondence courses, or where personal instruction is limited. It would seem to be an excellent volume for officers studying Electrical Engineering aboard ship and for their use in connection with instruction of the enlisted force in the subject of alternating currents, which must soon become a vital factor in the handling of ships. H. G. K.

MINUTES OF THE ANNUAL MEETING, 1915

U. S. NAVAL INSTITUTE, ANNAPOLIS, MARYLAND,
OCTOBER 8, 1915.

In pursuance of the following notice the annual meeting was held at 8.20 p. m. at the Officers' Mess:

U. S. NAVAL ACADEMY, ANNAPOLIS, MARYLAND,
October, 5, 1915.

To Members of the United States Naval Institute:

The regular annual meeting of the United States Naval Institute and the election of officers will take place in the board room of the Officers' Mess at the United States Naval Academy on Friday, October 8, 1915, at 8.00 p. m.

B. C. ALLEN,
Lieut. Commander, U. S. Navy,
Secretary and Treasurer.

Captain E. W. Eberle, U. S. Navy, Vice-President, presided, there being thirty-one members present.

The minutes of the last annual meeting were read and approved.

The first and stated business being the election of officers, the following tellers, having been appointed by the Chairman ten days previous—

Commander Ralph Earle, U. S. Navy.
Lieut. Commander Sinclair Gannon, U. S. Navy.
Lieutenant G. W. Kenyon, U. S. Navy.

reported the following named officers elected for the ensuing year —1915-1916:

President

Rear Admiral Bradley A. Fiske, U. S. Navy.

Secretary and Treasurer

Lieut. Commander B. C. Allen, U. S. Navy.

Board of Control

Chief Constructor D. W. Taylor, U. S. Navy.
Captain L. H. Chandler, U. S. Navy.
Colonel E. K. Cole, U. S. M. C.
Commander L. M. Nulton, U. S. Navy.
Commander J. R. Pringle, U. S. Navy.
Commander J. T. Tompkins, U. S. Navy.

The vote on the proposed amendment to Art. VII, Sec. 8, and Art. X, Sec. 2, was reported by the tellers as follows:

For the amendment	577
Against the amendment	7

The following is a copy of the proposed amendment to Art. VII, Sec. 8, and Art. X, Sec. 2, which was submitted to the members:

ARTICLE VII

SEC. 8. The annual dues for regular and associate members shall be two dollars, all of which shall be for a year's subscription to the UNITED STATES NAVAL INSTITUTE PROCEEDINGS, payable upon joining the Institute and upon the first day of each succeeding January. The fee for life membership shall be thirty dollars, but if any regular or associate member has paid his dues for the year in which he wishes to be transferred to life membership, or has paid his dues for any future year or years, the amount so paid shall be deducted from the fee for life membership.

ARTICLE X

SEC. 2. One copy of the PROCEEDINGS, when published, shall be furnished to each regular and associate member (in return for dues paid), to each life member (in return for life membership fee paid), to honorary members, to each corresponding society of the Institute, and to such libraries and periodicals as may be determined upon by the Board of Control.

SECRETARY AND TREASURER'S REPORT

1. During the past year a gratifying increase in interest in the Institute has been manifested throughout the service, and in civil life, with a correspondingly great increase in number of articles submitted and in membership.

2. The membership is now 2070, subscribers 505, exchanges 96, advertisers 24 and newspapers 24—total circulation 2711. During the year 503 new members have joined, 5 have resigned and 18 have died, making a net increase of 479 as compared to 288 last year, and 200 the year before. This increase is made up principally from officers of the navy, all but three of the class of 1915 being included, but officers of allied services and civilians have joined in good numbers. There are about fifty (50) members in the marine corps, about 25 in the army, 85 in the naval militia, 40 in the coast guard, 150 civilians, and thirty (30) officers in foreign services.

3. The bi-monthly issue has been made for over a year, with a cost per year of about $10,000, average issue 2800 copies. The

quarterly issue, averaging 2000 copies, cost about $9000 per year. It costs about $4000 per year more to publish the PROCEEDINGS and for salaries than the income from membership dues, subscriptions and advertising. The sale of books makes up the deficit and leaves a profit for investment. An issue of 5000 will make the PROCEEDINGS self-supporting. The Book Department inaugurated recently is already doing well, and bids fair to be a profitable branch, as well as of value and convenience to members.

4. During the year two changes in personnel of the officers of the Institute have occurred—Captain E. W. Eberle became Vice-President, *ex-officio,* upon the detachment of Admiral Fullam. Colonel E. K. Cole, U. S. Marine Corps, was elected a member of the Board of Control vice Commander W. W. Phelps, resigned upon detachment.

5. The prize essay for 1915 was again won by Lieut. Commander D. W. Knox, U. S. Navy, the honorable mention essays were by Commander T. D. Parker, U. S. Navy, Ensign H. H. Frost, U. S. Navy, and Ensign R. T. Merrill, 2d, U. S. Navy. The latter two were confidential in nature, and the Navy Department refused permission to publish them. They have been or are to be published by the War College, however. Twenty-five essays were submitted.

6. The following text-books have been revised: Electrician's Text-Book; Marine and Naval Boilers; Exterior Ballistics, Landing Force and Small Arms Instructions, Manual of Wireless Telegraphy, and Naval Ordnance. The cost of revising and printing these books has been paid, and the copies we now have on hand represent a cost of $8,603.90, and since they are all text-books on which sale is sure, this amount can be considered an asset. As a matter of fact, these books will sell for considerably more than that amount.

7. The excess of receipts over expenditures is as follows:

RECEIPTS AND DISBURSEMENTS FROM OCT. 1, 1914, TO SEPT. 30, 1915

Total Receipts for the Year	$38,056.19
Balance on hand October 1, 1914	17,638.68
	$55,694.87
Total Disbursements for the Year	40,955.43
Balance on hand October 1, 1915	$14,739.44

BILLS RECEIVABLE

For Dues	$1,263.95	
For Extra Publications	4,439.30	
For Advertisements	106.64	
		$5,809.89
		$20,549.33

LIABILITIES

Lord Baltimore Press	$4,246.56	
Newsdealers, Expressage, Etc.	121.74	
		4,368.30
		$16,181.03

The following persons were duly elected members of the Institute:

Mr. Earle Farwell.
Lieutenant A. P. Calvanti, B. N.
Mr. Hugh P. Tiemann.
Colonel Edward W. Creecy.
Captain R. H. Fletcher, U. S. A.
Mr. John C. Richberg.
Mr. W. B. Buckminister.
Mr. Charles H. Merrill.
Mr. Earle R. Anderson.
Mr. W. D. Weaver.
Captain C. A. Seoane, U. S. Army.
Mr. Alex B. Legare.
Dr. F. E. Bunts.
Mr. George P. Blow.
Lieutenant S. W. Utley, Michigan Naval Brigade.
Commander Edward McPeters, N. J. N. M.
Mr. J. C. Drake.
Ensign H. K. Koenig, California Naval Militia.
Dr. Oscar Parks, Jayn's Naval Annual.
Mr. Fred T. Jane, Jayn's Naval Annual.
Paymaster G. C. Hall, Michigan Naval Brigade.
Lieutenant J. F. Zenneck, N. J. Naval Militia.
Lieutenant H. N. Wood, U. S. C. G.
Lieutenant C. O. Brickenhoff, N. Y. N. M.
Mr. John H. Barnard.
Mr. Walter Bensel.
Mr. Robert Philips.
Lieutenant C. A. Tinker, Massachusetts Naval Militia.
Mr. H. K. McCay.
Lieutenant R. H. Nexsen, N. Y. Naval Militia.

Lieutenant A. H. Baker, Massachusetts Naval Militia.
Lieutenant C. E. Finken, N. Y. Naval Militia.
Lieutenant Leon Dichman, N. Y. Naval Militia.
Ensign E. J. Johnstone, N. Y. Naval Militia.
Lieutenant of Engineers J. F. Hahn, U. S. C. G.
Mr. W. C. Allen.
Mr. C. B. Gill.
Captain J. M. Moore, U. S. C. G.
Dr. R. B. Taber, Michigan Naval Militia.
Lieutenant Charles K. Fermer, Michigan Naval Brigade.
Lieutenant C. E. Burr, Michigan Naval Brigade.
Ensign C. V. Spawr, Michigan Naval Brigade.
Lieutenant E. A. Bradner, Washington Naval Militia.
Commander J. F. Lewis, Michigan Naval Militia.
Lieutenant H. R. Ford, N. Y. Naval Militia.
Ensign L. H. Dangel, N. Y. Naval Militia.
Mr. Edward L. Webb.
Lieutenant F. E. Bagger, U. S. C. G.
Paymaster M. I. Dean, Massachusetts Naval Militia.
Lieutenant W. E. Lewis, Illinois Naval Militia.
Ensign Edward Taylor, Illinois Naval Militia.
Mr. R. E. Jones.
Mr. Lloyd C. Stark.
Mr. W. J. Grambs.
Captain H. B. West, U. S. C. G.
Lieutenant H. J. Parent, Massachusetts Naval Militia.
Mr. Charles S. Yost.
Mr. J. Park Dougall.
Mr. J. T. McMillan.
Mr. A. B. McNeill.
Mr. W. P. Butler.
Mr. W. P. Vetter.
Mr. J. V. Merrick.
Lieutenant W. A. Ratigan, Massachusetts Naval Militia.
Lieutenant Edward W. Keith, Massachusetts Naval Militia.
Ensign F. W. Lanagan, Massachusetts Naval Militia.
Mr. William H. Rucker.
Lieutenant B. L. Brockway, U. S. C. G.
Mr. Charles R. Norris.
Mr. E. S. Smith.
Lieutenant A. E. Biddinger, Ohio Naval Militia.
Captain D. F. de Otte, U. S. C. G.
Lieutenant Carlos P. Botto, B. N.
Lieutenant George M. Mashek, Michigan Naval Brigade.
Lieutenant W. P. Kain, U. S. C. G.
Mr. Martin L. Valentine.
Lieutenant J. L. Schlichting, N. J. Naval Militia.
Ensign W. R. Wortley, Michigan Naval Militia.

Mr. Henry H. Fox.
Mr. L. W. Greeno.
Lieutenant William C. Myers, U. S. C. G.
Lieutenant R. G. Willoh, Ohio Naval Militia.
Lieutenant L. R. Rutter, Illinois Naval Militia.
Mr. H. H. Johnstone.
Mr. W. B. Allison.
Lieutenant C. C. Von Paulsen, U. S. C. G.
Captain A. J. Henderson, U. S. C. G.
Mr. Edward Breck.
Lieutenant W. E. Davis, Illinois Naval Militia.
Lieutenant W. E. McNelly, Washington Naval Militia.
Mr. Albert M. Moodie.
Lieutenant R. W. Clark, California Naval Militia.
Lieutenant C. Aronstein, Royal Dutch Navy.
Lieutenant L. V. Kielhorn, U. S. C. G.
Lieutenant H. J. Angley, N. Y. Naval Militia.
Captain J. H. Brown, U. S. C. G.
Mr. C. H. Stoer.
Mr. Harold H. Emmons.
Lieutenant S. B. Austin, Maryland Naval Militia.
Lieutenant H. C. McElderry, Maryland Naval Militia.
Lieutenant A. L. Malone, Maryland Naval Militia.
Lieutenant F. S. Lynn, Maryland Naval Militia.
Lieutenant A. D. Hodgdon, Maryland Naval Militia.
Ensign C. F. Goob, Maryland Naval Militia.
Ensign E. A. McVey, Maryland Naval Militia.
Lieut. Commander H. W. York, N. Y. Naval Militia.
Ensign H. L. Howe, N. Y. Naval Militia.
Ensign R. D. DeWolf, N. Y. Naval Militia.
Lieutenant P. F. Roach, U. S. C. G.
Captain W. W. Joynes, U. S. C. G.
Ensign C J. McNamara, N. J. Naval Militia.
Captain B. L. Reed, U. S. C. G.
Mr. J. W. Sefton
Lieutenant F. A. Zschenschler, U. S. C. G.
Mr. A. R. Bush.
Mr. E. C. Miller.
Mr. J. C. Hoffmann.
Mr. M. J. Torlinski.
Captain H. L. Boyd, U. S. C. G.
Mr. John Reilly, Jr.
Engineer Lieutenant Shigemasa Kato, I. J. N.
Mr. A. S. Kemman.
Lieutenant H. G. Hemingway, U. S. C. G.
Lieutenant W. T. Hornung, N. Y. Naval Militia.
Mr. Carl P. Jungling.
Captain J. H. Bland, Florida Naval Militia.

Mr. W. H. Drury.
Mr. G. W. Littlehales.
Mr. Francis W. Perry.
Ensign J. P. Smart, Naval Forces of Pennsylvania.
Mr. C. D. Sinclair.
Mr. Ansell M. Kellogg.
Lieutenant Y. Taji, I. J. N.
Mr. Robert L. Bacon.
Mr. Newbold T. Lawrence.
Lieutenant F. L. Austin, U. S. C. G.
Mr. J. K. Nightingale.
Ensign A. F. Kenyon, N. Y. Naval Militia.
Mr. E. W. Padelforn.
Mr. Vincent Astor.
Mr. Charles S. Gleed.
Captain Randolph Ridgely, U. S. C. G.
Mr. Lewis Maury.
Mr. H. M. Curtis.
Mr. W. P. Hayes.
Mr. John L. Saltonstall.
Lieutenant Jose Junqueira Rato, P. N.

LIFE MEMBER

Mr. Lorenzo Semple.

There being no further business before the meeting, adjournment was had at 8.55 p. m.

B. C. ALLEN,
Lieut. Commander, U. S. Navy,
Secretary and Treasurer.

NOTICE

The U. S. Naval Institute was established in 1873, having for its object the advancement of professional and scientific knowledge in the Navy. It now enters upon its forty-second year of existence, trusting as heretofore for its support to the officers and friends of the Navy. The members of the Board of Control cordially invite the co-operation and aid of their brother officers and others interested in the Navy, in furtherance of the aims of the Institute, by the contribution of papers and communications upon subjects of interest to the naval profession, as well as by personal support and influence.

On the subject of membership the Constitution reads as follows:

ARTICLE VII

Sec. 1. The Institute shall consist of regular, life, honorary, and associate members.

Sec. 2. Officers of the Navy, Marine Corps, and all civil officers attached to the Naval Service, shall be entitled to become regular or life members, without ballot, on payment of dues or fees to the Secretary and Treasurer. Members who resign from the Navy subsequent to joining the Institute will be regarded as belonging to the class described in this Section.

Sec. 3. The Prize Essayist of each year shall be a life member without payment of fee.

Sec. 4. Honorary members shall be selected from distinguished Naval and Military Officers, and from eminent men of learning in civil life. The Secretary of the Navy shall be, *ex officio*, an honorary member. Their number shall not exceed thirty (30). Nominations for honorary members must be favorably reported by the Board of Control, and a vote equal to one-half the number of regular and life members, given by proxy or presence, shall be cast, a majority electing.

Sec. 5. Associate members shall be elected from Officers of the Army, Revenue Cutter Service, foreign officers of the Naval and Military professions, and from persons in civil life who may be interested in the purposes of the Institute.

Sec. 6. Those entitled to become associate members may be elected life members, provided that the number not officially connected with the Navy and Marine Corps shall not at any time exceed one hundred (100).

Sec. 7. Associate members and life members, other than those entitled to regular membership, shall be elected as follows: "Nominations shall be made in writing to the Secretary and Treasurer, with the name of the member making them, and such nominations shall be submitted to the Board of Control, and, if their report be favorable, the Secretary and Treasurer shall make known the result at the next meeting of the Institute, and a vote shall then be taken, a majority of votes cast by members present electing."

Sec. 8. The annual dues for regular and associate members shall be two dollars, all of which shall be for a year's subscription to the UNITED STATES NAVAL INSTITUTE PROCEEDINGS, payable upon joining the Institute, and upon the first day of each succeeding January. The fee for life membership shall be thirty dollars, but if any regular or associate member has paid his dues for the year in which he wishes to be transferred to life membership, or has paid his dues for any future year or years, the amount so paid shall be deducted from the fee for life membership.

ARTICLE X

Sec. 2. One copy of the PROCEEDINGS, when published, shall be furnished to each regular and associate member (in return for dues paid), to each life member (in return for life membership fee paid), to honorary members, to each corresponding society of the Institute, and to such libraries and periodicals as may be determined upon by the Board of Control.

The PROCEEDINGS are published every two months, and anyone may subscribe for them. The annual subscription is $3.00; single copies, 50 cents. Annual dues for members and associate members, $2.00. Fee for life membership, $30.00.

All letters should be addressed U. S. Naval Institute, Annapolis, Md., and all checks, drafts, and money orders should be made payable to the same.

SPECIAL NOTICE

NAVAL INSTITUTE PRIZE ESSAY, 1916

A prize of two hundred dollars, with a gold medal, and a life-membership (unless the author is already a life member) in the Institute, is offered by the Naval Institute for the best essay presented on any subject pertaining to the naval profession.

On the opposite page are given suggested topics. Essays are not limited to these topics and no additional weight will be given an essay in awarding the prize because it is written on one of these suggested topics over one written on any subject pertaining to the naval profession.

The following rules will govern this competition:

1. The award for the prize will be made by the Board of Control, voting by ballot and without knowledge of the names of the competitors.

2. Each competitor to send his essay in a sealed envelope to the Secretary and Treasurer on or before January 1, 1916. The name of the writer shall not be given in this envelope, but instead thereof a motto. Accompanying the essay a separate sealed envelope will be sent to the Secretary and Treasurer, with the motto on the outside and writer's name and motto inside. This envelope is not to be opened until after the decision of the Board.

3. The successful essay to be published in the PROCEEDINGS of the Institute; and the essays of other competitors, receiving honorable mention, to be published also, at the discretion of the Board of Control; and no change shall be made in the text of any competitive essay, published in the PROCEEDINGS of the Institute, after it leaves the hands of the Board.

4. If, in the opinion of the Board of Control, the best essay presented is not of sufficient merit to be awarded the prize, it may receive "Honorable Mention" or such other distinction as the Board may decide.

5. In case one or more essays receive "Honorable Mention," the writers thereof will receive a minimum prize of seventy-five dollars and a life-membership (unless the author is already a life member) in the Institute, the actual amounts of the awards to be decided by the Board of Control in each case.

6. An essay not having received honorable mention may be published also, at the discretion of the Board of Control, but only with the consent of the author.

7. The essay is limited to fifty (50) printed pages in the PROCEEDINGS of the Institute.

8. It is requested that all essays be submitted typewritten and in duplicate, if practicable; essays submitted written in longhand and in single copy will, however, receive equal consideration.

9. In the event of the prize being awarded to the winner of a previous year, a gold clasp, suitably engraved, will be given in lieu of the gold medal.

By direction of the Board of Control.

B. C. ALLEN,
Lieut. Commander, U. S. N., Secretary and Treasurer.

PRIZE ESSAY TOPICS

SUGGESTED AT THE INVITATION OF THE BOARD OF CONTROL

BY

THE PRESIDENT OF THE NAVAL INSTITUTE, THE SUPERINTENDENT OF THE NAVAL ACADEMY, THE PRESIDENT OF THE NAVAL WAR COLLEGE, AND THE COMMANDERS-IN-CHIEF OF THE ATLANTIC, PACIFIC AND ASIATIC FLEETS.

"The Mutual Relations of Gunnery and Tactics."

"The Place of the Naval Officer in International Affairs."

"The Evolution of Naval Doctrine from National Character."

"The Training of Enlisted Personnel to Produce Modern Man-o'-Warsmen: (a) Military Training; (b) Moral Training; (c) Education."

"The Organization, Employment and Training of Reserve Fleets and Flotillas."

"A Personnel Reserve for the Naval Service."

"Value of Speed as an Offensive Element in Battleship Strategy and Tactics, as Compared with Armor."

LIST OF PRIZE ESSAYS

1879

Naval Education. Prize Essay, 1879. By Lieut.-Com. A. D. Brown, U. S. N.

NAVAL EDUCATION. First Honorable Mention. By Lieut.-Com. C. F. Goodrich, U. S. N.

NAVAL EDUCATION. Second Honorable Mention. By Commander A. T. Mahan, U. S. N.

1880

"The Naval Policy of the United States." Prize Essay, 1880. By Lieutenant Charles Belknap, U. S. N.

1881

The Type of (I) Armored Vessel, (II) Cruiser best suited to the Present Needs of the United States. Prize Essay, 1881. By Lieutenant E. W. Very, U. S. N.

SECOND PRIZE ESSAY, 1881. By Lieutenant Seaton Schroeder, U. S. N.

1882

Our Merchant Marine: The Causes of its Decline and the Means to be taken for its Revival. "Nil clarius aquis." Prize Essay, 1882. By Lieutenant J. D. J. Kelley, U. S. N.

"MAIS IL FAUT CULTIVER NOTRE JARDIN." Honorable Mention. By Master C. G. Calkins, U. S. N.

"SPERO MELIORA." Honorable Mention. By Lieut.-Com. F. E. Chadwick, U. S. N.

"CAUSA LATET: VIS EST NOTISSIMA." Honorable Mention. By Lieutenant R. Wainwright, U. S. N.

1883

How may the Sphere of Usefulness of Naval Officers be extended in Time of Peace with Advantage to the Country and the Naval Service? "Pour encourager les Autres." Prize Essay, 1883. By Lieutenant Carlos G. Calkins, U. S. N.

"SEMPER PARATUS." First Honorable Mention. By Commander N. H. Farquhar, U. S. N.

"CULIBET IN ARTE SUA CREDENDUM EST." Second Honorable Mention. By Captain A. P. Cooke, U. S. N.

1884

The Reconstruction and Increase of the Navy. Prize Essay, 1884. By Ensign W. I. Chambers, U. S. N.

1885

Inducements for Retaining Trained Seamen in the Navy, and Best System of Rewards for Long and Faithful Service. Prize Essay, 1885. By Commander N. H. Farquhar, U. S. N.

1886

What Changes in Organization and Drill are Necessary to Sail and Fight Effectively Our Warships of Latest Type? "Scire quod nescias." Prize Essay, 1886. By Lieutenant Carlos G. Calkins, U. S. N.

THE RESULT OF ALL NAVAL ADMINISTRATION AND EFFORTS FINDS ITS EXPRESSION IN GOOD ORGANIZATION AND THOROUGH DRILL ON BOARD OF SUITABLE SHIPS. Honorable Mention. By Ensign W. L. Rodgers, U. S. N.

1887

The Naval Brigade: its Organization, Equipment and Tactics. "In hoc signo vinces." Prize Essay, 1887. By Lieutenant C. T. Hutchins.

1888

Torpedoes. Prize Essay, 1888. By Lieut.-Com. W. W. Reisinger, U. S. N.

1891

The Enlistment, Training and Organization of Crews for our Ships of War. Prize Essay, 1891. By Ensign A. P. Niblack, U. S. N.

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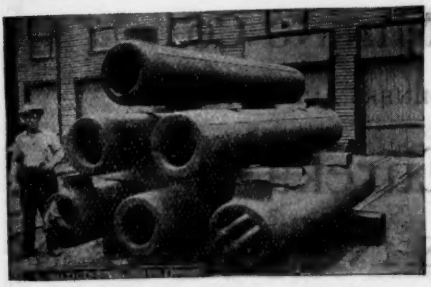

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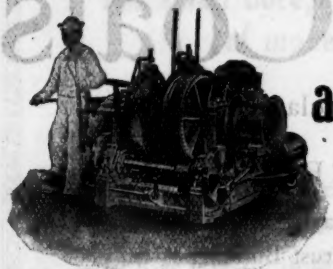

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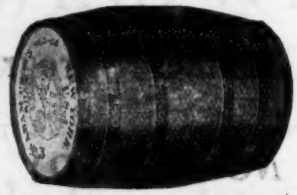

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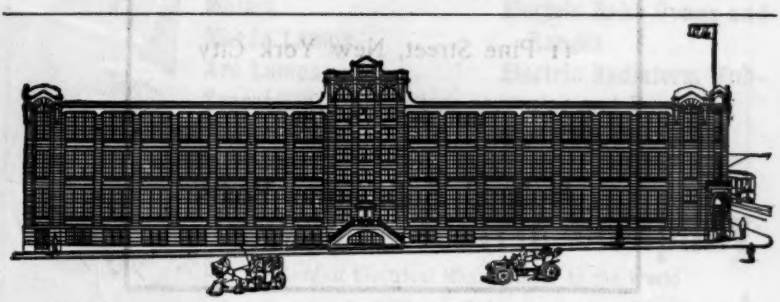

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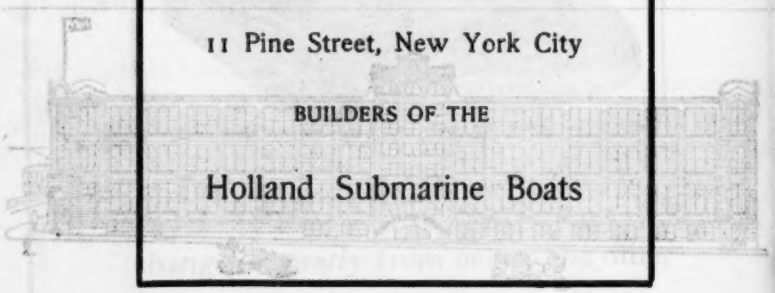

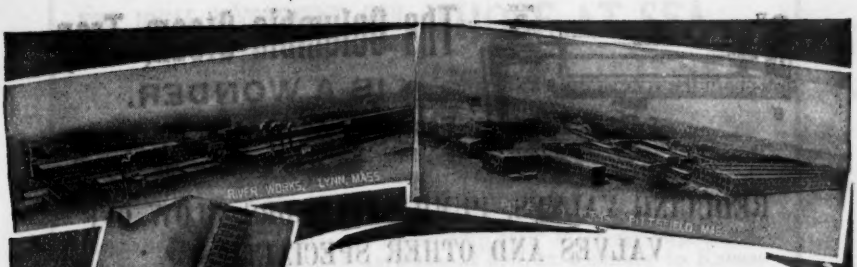

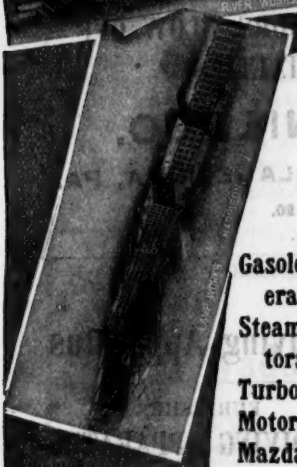

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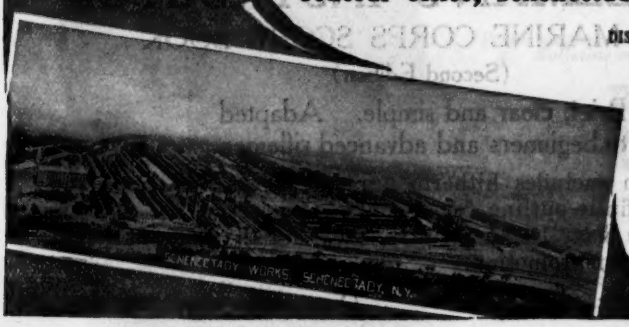

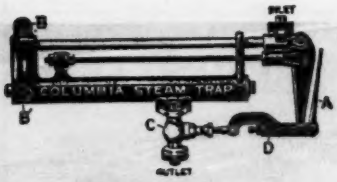

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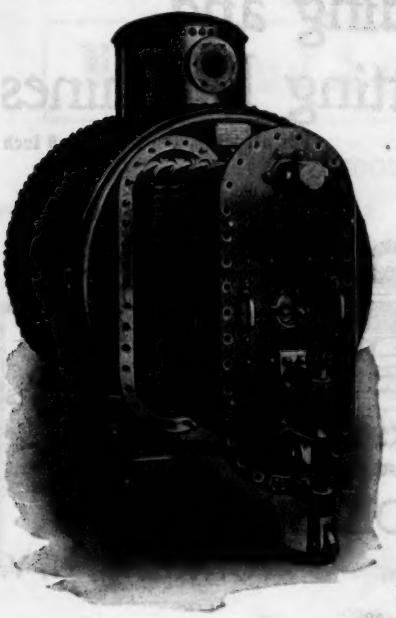

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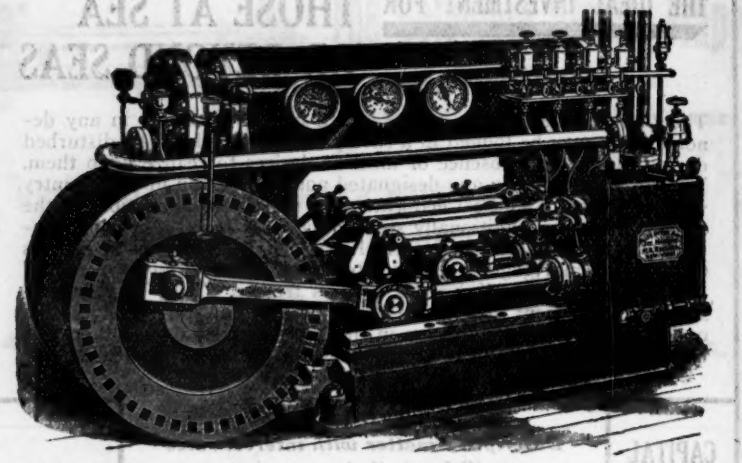

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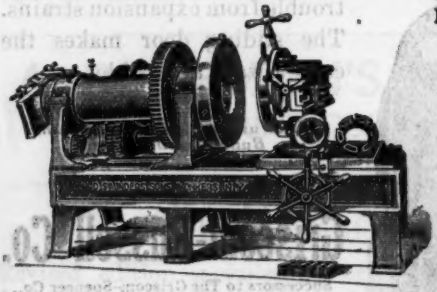

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Ship **5,000,000** tons per annum by all-rail, tidewater and the Great Lakes

Largest Producers of Smokeless Coal in the United States

The average of **43** analyses made by the United States Government of **"Original Pocahontas"** coal, taken from cargoes furnished by Pocahontas Fuel Company, is as follows:

"P.F.C." Registered Signal Hampton Roads

Fixed Carbon	74.81%
Volatile Matter	18.88%
Sulphur	.67%
Ash	4.79%
Moisture	.85%
Total	100.00%
British Thermal Units	15,003

"P.F.C." Original Pocahontas Trade Mark

This coal is marketed under the brand of **"Original Pocahontas"**. The first shipments of coal from the Pocahontas Coal Field were made from the mines of Pocahontas Consolidated Collieries Company, Incorporated, at Pocahontas, Virginia, in 1882, which mines have since continuously mined and are now mining the No. 3 vein and shipping the highest grade of Pocahontas coal.

Largest Exporters of Semi-Bituminous Coal in the United States

No. 1 BROADWAY, NEW YORK

BRANCH OFFICES

NORFOLK, VIRGINIA: 117 Main Street. BOSTON, MASS.: Board of Trade Bldg.
CHICAGO, ILLINOIS: Fisher Building. CINCINNATI, OHIO: Traction Bldg.
BLUEFIELD, WEST VIRGINIA: Pocahontas Building.

AGENTS AND DISTRIBUTORS IN NEW ENGLAND

NEW ENGLAND COAL AND COKE CO., 111 Devonshire St., and Everett Dock, BOSTON, MASS.

DISTRIBUTING WHARVES ON GREAT LAKES

SANDUSKY, OHIO, AND TOLEDO, OHIO

TIDEWATER PIERS

LAMBERT POINT, SEWALLS POINT, NORFOLK AND NEWPORT NEWS, VA.

Tugs Bunkered at CITY PIERS, NORFOLK, VA.

London Agents: EVANS & REID, Ltd., 101 Leadenhall Street, London, E. C., England.
Agents in Italy: HENRY COE & CLERICI, Piazza S. Matteo 15, Genoa.
Latin-American, West Indian, and European Coal Consumers Invited to Correspond with

POCAHONTAS FUEL COMPANY
No. 1 Broadway, New York City, U. S. A.

Cable Address: "Pocahontas". Codes: "Watkins'", "Scott's 10th", "A. B. C. 4th and 5th Improved", "Western Union", and "Lieber's"

WE CAN SHIP YOU COAL NOW

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